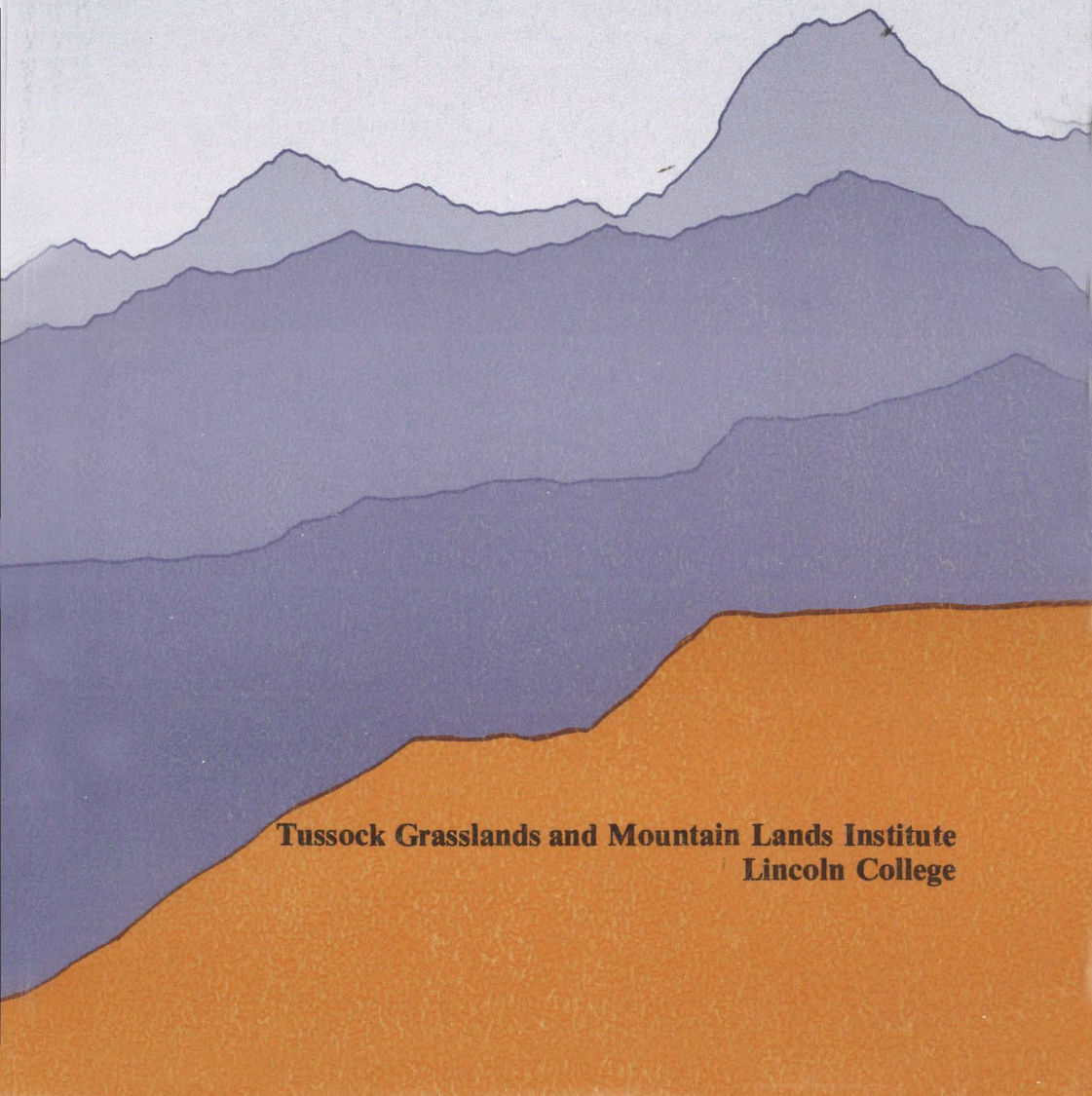
Proceedings of the 1987 Hill and High Country Seminar



Tussock Grasslands and Mountain Lands Institute
Lincoln College

Proceedings of the 1987 Hill and High Country Seminar

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Land protection–some issues, some options

Mr Chris Kerr*

Introduction

Three land protection issues of rapidly growing significance to the management of the hill and high country are:

- the reform of pest control administration
- the relevance of pastoral leasehold tenure, and
- the meaning of soil conservation.

It seems likely that land occupiers, either individually or collectively, will be required to meet all the costs of animal and plant pest control. Pastoral land is now seen as capable of a much wider range of uses than was envisaged when pastoral leasehold tenure was established. Finally there is a growing realisation that the disciplines of soil conservation and of land management are in fact indistinguishable.

Pest control administration

Recently, I have been involved in a review of plant and animal pest control administration. The objective was to set out in a discussion paper, some of the issues and options for reform. Government has resolved to reduce and eventually eliminate taxpayer funding so the Ministry of the Environment, on behalf of government, is seeking to find a consensus for future action.

A public pest problem exists when private individuals acting alone cannot effect control. Some pests may be

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of limited distribution but capable of spreading, while others may be well established but of minor importance. Either way, pest management is an integral part of land management. The management of pests of public significance has, the objective of protecting land from the degrading effects of pests.

Without taxpayer input, the responsibility for the control of public pests will fall on the land occupier or on the local or regional community at least for routine pest control. So far there has been no expression of intent by government about a commitment to research, training, surveillance, quarantine and ready reaction.

What will be the effect of this reduction in funding by central government? Clearly the existing administration will change. There are four options:

- the status quo: the retention of a diverse set of administrative structures supported by a mix of taxpayer, ratepayer and private funding;

- wholesale decentralisation: the funding of all elements of pest management by affected parties and control operations carried out by land occupiers, contractors, or by local or regional government.

- a centralised structure: the creation of single hierarchical organisation serving multiple objectives; and

- dual approach: with autonomous local or regional pest authorities, and a separate administration dealing with national pest problems.

The latter is the preferred option because it is selective, flexible, accountable, and is best able to balance all the components of pest management (i.e. routine control, ready reaction, training, research, and surveillance).

Most pest management problems are also problems for land managers. By way of example the much publicized

rabbit problem is as much a land management problem as it is a pest management problem.

It is nothing short of a national disgrace that oppossums have been allowed to wreck such widespread havoc in forests and in addition, seriously jeopardise the export prospects of three major industries. Similar analogies apply to all public pests. Any reform of pest administration must ensure that pest control and land management are no longer separated by a gulf of financial, technical, and administrative independence.

The administration of pastoral land

The relevant provisions of the Land Act 1948 define pastoral land as 'land suitable or adaptable primarily for pastoral purposes only'. What on earth does this mean? Is it intended that pastoral land be used exclusively for 'pastoral purposes' and thereby exclude all other uses?

In 1948 it seems the only perceived use for the occupied high country was extensive pastoralism. There was, however, a chorus of public statements about the deteriorated condition of the high country. Pastoral land tenure with its restrictions of stocking, burning and cultivation, was seen as necessary "... for some control to be exercised... for soil conservation purposes... and the regeneration of (land) in the lease."

Coincidently the same era brought about the Soil Conservation and Rivers Control Act 1941, the need for which arose from the many expressions of public concern about the damage from flooding and loss of soil resources.

Legislators and land administrators saw the pastoral lease as a principal means of achieving rehabilitation of the high country. In reality it took all the combined effects of new knowledge, determination, vastly improved economic conditions, the establishment of rabbit boards and catchment authorities, and the constraints of the pastoral lease, to trigger the fairly impressive recovery

which occurred over the last forty years. Rabbit control, fencing, controlled grazing and pasture improvement have, to a large degree, reversed the process of deterioration.

This is not to say all is perfect. Serious questions about the management of semi-arid land, high altitude land, shallow and depleted soils, wetlands, and riparian lands still waiting to be addressed. The sustainability of pastoral production of unimproved (or improved but not maintained) grassland is in itself the ultimate question. Conversely, the under-utilisation of existing land resources has been often commented on.

Until comparatively recently, the mix of uses to which the high country can be put has not been generally appreciated. The initiatives of many farmers have pointed the way to the future as they have sought to include forestry, tourism, recreation, conservation, and other enterprises into the 'pastoral' high country. A high mountain conference facilitated by the Tussock Grasslands and Mountain Lands Institute in 1978 widened horizons and resulted in 1979 in an explicit policy statement by government. This policy statement was intended as a guide for public agencies responsible for land administration, land settlement, water and soil conservation, land use planning, nature conservation, recreation and the provision of public facilities generally.

With one exception (and this was a token effort) the published policies of the many public agencies such as the Land Settlement Board high country policy 1980 (the one exception), the NWASCA hill and high country policy 1981, the Land Settlement Board commercial recreation policy 1985, the Wetlands Policy 1986, and the many district scheme policy statements all of which affect the use of the high country make no mention of the overriding government policy statement. The result is a series of unconnected policies and a reinforcement of the existing land use rules. The existing institutionalised monoculture is required to be continued in spite of clear and powerful market signals which seek change. Only a small part of what was envisaged in 1979 has been put into effect.

Let me exemplify the position today by referring to rentals for pastoral leases. After an extraordinarily convoluted public debate the result has been a seemingly unrelated set of policies which set the rentals for pastoral farming at one and a half percent (rising to two and a quarter percent) of the value of land exclusive of improvements, four and a half percent of LEI for any lessee impertinent enough to embark on forestry on the same land, and a rental of up to five percent of the annual turnover for commercial recreation. What equity is there in this arrangement? Surely it is equitable to have similar rentals and other lease conditions for all valid commercial uses of the high country. In a market economy how else will land use be optimised?

The rights of exclusive occupancy and perpetual rights of renewal held by pastoral lessees obviously gives them a pre-emptive right to decide on all land use opportunities be they commercial or non-commercial. For instance the designs of the nation for a widely diverse mix of uses for the high country can only be put into effect through the voluntary compliance of lessees.

As a result of recent reforms of the administration of Crown land, the Land Corporation Ltd (as agent for the Crown) and the Department of Conservation have joint responsibility for pastoral land. Land Corporation Ltd is to undertake routine administration while the Department of Conservation is to identify and protect conservation values. Presumably conservation values on pastoral land include those very things the tenure was designed to protect : soil, water, and vegetation. In addition, the protection of landscapes, historical and archeological sites, sites of scientific importance, and public recreation needs are inferred, because these are among the objectives of the Department of Conservation.

Two questions arise: How is the Department of Conservation going to effect the protection of conservation values? What is the status of the remaining 'unprotected' pastoral land?

Unless lessees agree to the imposition of further restrictive covenants ensuring full protection of conservation values, I can foresee the Crown inevitably being required to purchase the lessee's interest in the land to be protected. I can find no evidence that government has budgeted for this likely eventuality.

Clearly the Department of Conservation will need to enlist the cooperation of the National Water and Soil Conservation Authority and catchment authorities so that the resources of both conservation arms of government will be efficiently utilised. Hopefully a proposal from the Tussock Grasslands and Mountain Lands Institute to help the Department to facilitate the management of an inter-disciplinary and inter-agency team to undertake the identification and protection programme will be viewed positively.

Without the 'protected' land in the lease the necessity for a pastoral lease appears to be extinguished. Where 'protection' is not required, reclassification to a tenure with the right to the fee simple appears warranted. However, in practice, an ideal boundary between privately owned and publicly owned (and managed) high country land is not easily defined. An intermediate tenure in the form of an occupation licence would be one means of ensuring the public interest in the 'grey' in-between zone is not diminished.

I have come to the conclusion that the era of pastoral land tenure is coming to an end. Recent history has shown it to be incapable of easily accommodating the wide range of uses to which areas of the high country is capable and for which there is obviously a growing demand. Without the constraints of a single purpose land tenure, a more exciting, varied and confident future in the high country is both possible and likely.

Soil conservation

The Soil Conservation and Rivers Control Act 1941 is an Act to make provision for the conservation of soil

resources and for the prevention of damage by erosion, and to make better provision with respect to the protection of property from damage by floods.

It follows that soil conservation is all about the conservation of soil resources. It is not limited to the prevention of soil erosion. Soil conservation is land management because without a comprehensive approach to soil conservation the objectives of conservation of soil resources cannot be accomplished with certainty.

Over the years soil conservation in New Zealand has been practised with the single-minded purpose of controlling active soil erosion. Obviously when it is possible to do so soil erosion should be prevented.

The operative word is prevent. For this to happen the practices of soil conservation need to be applied before accelerated soil erosion occurs - not after.

Government, through catchment authorities has offered incentives to rural land occupiers to adopt management practices which lead to the mitigation of soil erosion. Broadly these incentives operated under the principle: the greater the erosion the greater the incentive. It was not long before soil conservators were seen as purveyors of subsidies for controlling soil erosion and found themselves restrained from being involved in other aspects of land management which would avoid the loss of soil resources. If we accept that natural erosion processes are largely uncontrollable it follows that soil conservators should be concentrating their efforts on the control of accelerated erosion most of which should have been foreseen and prevented. Now that public funding of the hitherto voluntary incentive programmes for soil conservation is being reduced there is an increased likelihood that soil conservation policies will be implemented by statutory means. It has not been easy for many land occupiers and land administrators to accept that major errors in land management were made and that rehabilitation is likely to be slow, costly, and may require fundamental changes in land use. The cost of rehabilitation will inevitably fall

heavily on present and possibly future land occupiers in their short-term role as guardians of the land for future generations.

For instance, the introduction of rabbits to the semi-arid land of Central Otago, the Upper Waitaki, and small parts of inland Marlborough, has been devastating to a point where recently the Parliamentary Commissioner for the Environment spoke of desertification. For over 100 years all attempts to eradicate rabbits or to establish protective vegetation in this zone have been noticeably unsuccessful. The soil conservation issues there are land management issues, and, I believe, should addressed as such - comprehensively - by integrating pest control, land tenure, and soil conservation.

Conclusion

Land protection, land management and soil conservation are indistinguishable. The concept which makes them indistinguishable is guardianship - the desire by both individuals and society as a whole to ensure that the resources of land and water endure for future generations.

The prevailing philosophies today seeks greater individual, local, or regional responsibility for the management of land. As fast as their bureaucracies will allow, government is apparently seeking to delegate administrative and funding responsibility. So it is with pest control, land administration, and soil and water conservation. Obviously, it is vitally important that the organisations entrusted with this added responsibility are indeed competent to manage land resources for the present and the future.

If this is not so, then I believe reform is pointless and options for land protection will remain a lively issue for debate.

Finally, are you ready for the reforms that are taking place?

MAFTech

Mr M. D. Gould*

If we in MAF have been doing our job correctly most people will know now that MAFTech exists. Many however may be considering what sort of new beast has been spawned. For those who look at things in structural terms, MAFTech is a combination of the old Agricultural Research Division and the extension side of the Advisory Services Division. For those who look at things in monetary terms, MAFTech is an operation which has an expenditure approaching $80 million per year and an income this year projected at approximately $10 million. For those discerning people who like to see the big picture, MAFTech is New Zealand's biggest single investment in the future of our land-based industries.

Many people, given today's circumstances, may be asking why New Zealand should invest in the future of agriculture and its related industries? The answer is simple. Land-based industries continue to underpin the economy of New Zealand and probably will for the foreseeable future. Any sound investment in agriculture is good business. Those who have been working in the agricultural field will have it as an article of faith that agriculture is the New Zealand economy. Others, who are not so closely associated with farming and its derivative industries, may have been persuaded that in today's world, this is no longer the case. It might be instructive then to look at where we have come from and where we are as far as agriculture's input into the New Zealand economy is concerned.

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Table 1. Value exports (NZ $ million F.O.B.)

Year Ended 30 June	1982	1983	1984	1985	1986	1986 as % Total Exports
Live Animals	53.0	60.3	60.7	80.2	114.5	1
Beef and Veal	619.9	719.6	634.8	953.0	691.7	7
Lamb	710.4	892.3	869.1	1,019.6	811.6	8
Mutton	145.8	88.8	124.6	131.1	122.7	1
Total meat and meat products	1,564.1	1,870.7	1,704.9	2,228.1	1,731.7	17
Butter	556.4	657.7	562.4	636.5	530.8	5
Cheese	181.5	193.5	235.9	256.8	267.2	3
Wholemilk powder	188.4	203.3	189.4	234.0	304.6	3
Skimmilk and buttermilk powder	201.5	214.0	205.8	271.5	236.6	2
Casein and caseinates	181.5	209.8	212.8	293.5	275.6	3
Total dairy products	1,327.8	1,497.3	1,426.7	1,717.0	1,715.8	17
Meat meal and pet food	50.2	68.4	80.3	101.7	35.6	0.3
Crude animal materials	71.4	74.9	77.3	103.7	94.4	1
Animal oil and fats	54.1	59.4	69.8	123.8	69.0	1
Greasy wool	363.6	415.9	448.7	551.9	412.5	4
Slipe wool	51.2	63.8	68.2	85.6	75.4	1
Scoured wool	504.0	537.2	596.4	837.7	803.0	8
Tops and yarns	40.2	36.1	53.0	82.4	88.0	1
Total wool	959.0	1,053.0	1,166.3	1,557.6	1,378.9	14
Hides and skins	152.9	185.2	200.0	357.1	319.5	3
Total pastoral based exports	4,232.5	4,869.2	4,786.0	6,269.2	5,459.4	54
Fresh kiwifruit	52.7	86.8	125.9	171.9	294.4	3
Apples and pears	53.4	60.7	89.3	108.2	117.5	1
Total fruit and vegetable	215.1	261.6	405.3	492.5	651.5	7
Cereal and cereal products	18.4	33.1	82.2	135.8	85.8	1
Feeding stuffs, seeds, vegetable products etc	21.8	32.6	26.0	34.0	42.7	0.4
Eggs and honey	7.0	6.1	6.2	8.1	11.8	-
Total agricultural based exports	4,660.4	5,202.6	5,305.7	6,939.6	6,251.2	62
Carpets	54.4	58.7	65.7	102.7	106.7	1
Leather	59.3	89.4	95.2	127.8	119.9	1
Dressed skins	5.6	5.7	6.0	9.3	11.3	1
Total Exports of New Zealand Produce	6,604.6	7,502.9	8,366.1	11,011.9	10,141.1	

Up until the 1970s agriculture was still running at above 70 percent of the export income. Since the oil shocks of the mid-1970s there has been a steady decline. In 1987

Table 2. New Zealand exports year ended March (NZ $ million)

	Merchandise Exports F.O.B.	% of Total	Exports of Services*	% of Total	Investment Income	% of Total	Total Exports
1967	774	86	105	12	24	3	903
1977	3023	79	687	18	103	3	3,813
1987	11,537	76	3,083	20	568	4	15,188

* Services include transportation, travel, insurance, others

Source: NZ Department of Statistics

there is no question that agriculture is not as dominant as it previously has been in terms of the export returns to New Zealand. However, Tables 1 and 2, and Figure 1 demonstrate that in spite of the rhetoric which has been voiced from time to time, income from land-based industries still underpins the New Zealand economy. This in spite of record low prices internationally. The question has been raised over recent years in many forums as to whether agriculture will again support the country in the way that it has. The figures outlined, demonstrate that at this time agriculture is still very important. However, what of the future?

The markets for the major agricultural products are uncertain. The dairy industry continues in its cyclical fashion. At the moment it is at the bottom of the cycle. Indications are however, that the cycle is likely to upturn within the next year or two. Changes in attitudes in both the United States and the EEC to their production surpluses are already having an input and affect. Prices for protein products have already risen significantly from the low prices of last year. It is worth remembering that dairying still contributes approximately 17 percent of our export income.

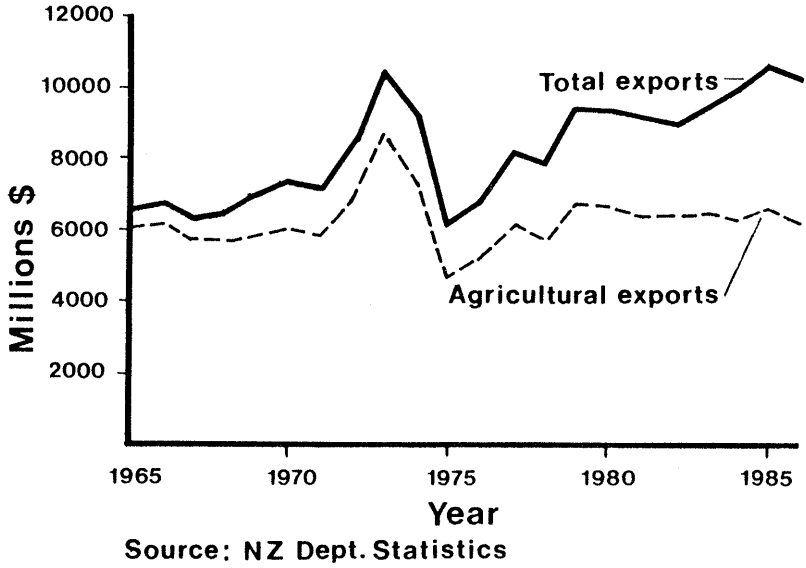

Figure 1. N.Z. agricultural exports compared to total merchandise exports in 1986 $

Wool, as you all here will know, is riding a high. This also is cyclical, depending in part on demand, price and relative positions of competitive products coming from the synthetic industries. However, there is nothing to indicate that as long as we are prepared to change with the times and the market trends, wool will continue to be a major export earner for New Zealand in the foreseeable future.

The major agricultural export earner from traditional agriculture is of course the meat industry. Looking at the international market in general terms it is easy to see the meat industry continuing to survive as long as it can react to changing customer needs. The beef industry, dominated by the American market, appears to have survived the drift away from beef into white meats based on a health fad. The lamb industry is another question however. There is a demand for sheep meats in many important areas of the world as long as customer

requirements of presentation, tenderness and consumer acceptability are met. The future for sheep meats lies in our hands, and there is nothing to indicate it can't be a very bright one.

Other ruminant-based livestock products such as those from deer and goats are also steadily gaining in significance. They will have their ups and downs, but they are here to stay.

Turning to horticulture, the increases in export incomes speak for themselves. Returns from pip fruit have been increasing rapidly over recent years. Returns from kiwifruit now eclipse all other horticulture products. Although market conditions will undoubtedly change in the future as other supplying countries' production comes on stream, there is at present no discernible market downturn for this amazing fruit. Other horticultural products are finding niche markets and provide a useful addition to the total horticultural export basket.

A quick "once-over lightly" assessment of the market for agricultural and horticultural products indicates that land-based industries do have a great future as long as we react positively to what our markets want and are prepared to pay for.

Enter MAFTech

Our mission is to Help Lead Effective Change in Agriculture. For agriculture read "land-based industries". Keeping in mind the foregoing assessment on agriculture, let us look at an assessment of change.

The rate of change in today's society has been well documented. Beginning with Toffler and "Future Shock", followed by "The Third Wave" and a number of subsequent books and articles from him, backed up further by "Megatrends" which outlined the ten major trends in the United States, change has been identified as the biggest single factor in today's society. Arguably, if any society or part of society is to remain relevant today, let alone

tomorrow, it must learn to handle not only change, but also the pace of change. If this tenet is accepted, a major concern of government may well be to ensure that the society it leads is keeping up and remaining competitive with other societies.

In choosing MAFTech's mission, these and other points have been taken into account. It would have been easy to simply label MAFTech as the research and technology unit for agriculture in New Zealand. We believe however, that while technology development is a very necessary underpinning of land-based industries, the ability of the rural sector to adjust to change is as equally important.

To give substance to MAFTech's mission it has been broken down into a number of smaller, more discrete statements which indicate more clearly some of the results which can be expected to come out of MAFTech. These are:

- Identifying opportunities for change
- Developing new technology
- Marketing the technologies
- Providing input to agricultural policy
- Implementing Government policies, and
- Supplying consultancy and training services.

You will see that identifying opportunities for change has been put at the top of the list. While that list is not in priority order, MAFTech is expecting to work with industry to identify changes in the marketplace or science or both which will impact on the rural sector. Once these changes have been identified, strategies need to be developed to get us from where we are to where we want to be. The theory is easy, the trick is to make it work in practice.

Developing and marketing new technology is the backbone of MAFTech's work. The secret of success in international marketing is staying ahead of competitors by giving people what they want. New products and new ways of

presenting old products needs research. No one invests millions of dollars (and that's what it takes to compete internationally) without knowing they are going to get a return on their investment. That is true for farming, processing or marketing. Consumers are more demanding in specifying their needs. This trend is in turn being reflected in tighter specifications all the way back down the line. For example, chilled lamb noisettes, suitable for the high quality market, require a heavier, leaner lamb than has been customary. These lambs must be produced for at least ten months of the year. This market opportunity requires a whole new way of producing, processing and distributing what is in effect a new product. Research is a necessary prerequisite for success in developing such a new system.

While MAF has been in research for some time, the marketing of its results is a new development. MAFTech represents a change in emphasis from an extension and advisory approach to one of marketing and commercialism. While some of the services will still be delivered free of cost, the emphasis is shifting towards services being designed for paying clients. Only time will tell how far this approach can be taken. Other types of research and technology development funding may well develop as a result of this policy change. Anything is now possible.

Providing advice for government policy and implementing government policies are an integral part of MAFTech's mission. While it will seem to many at this time that the economic policies have taken over agricultural policy, this condition is likely to last for a short time only. There still needs to be government policy which relates to the rural sector and MAFTech will be involved in advising on the formation of that policy.

MAFTech will also be involved in implementing rural policy. This is especially true in emergency response procedures, i.e. floods, earthquakes or other natural disasters. The very nature of the rural area requires some focal point and an administrative structure to cope

when things go wrong. It is anticipated that MAF will continue to play its role as it has in the past and MAFTech will be one of the principal deliverers of that role.

A further role for MAFTech has been identified in the training area. In the past this has been related mainly to the training of young people coming into agriculture. Assistance with the Young Farmers' Club, and training courses at Flock House and Telford have significantly added to the number of trained people coming into our rural society. To some extent this role may be taken over by others better trained to cope with vocational training than are the people in MAF. However, we will continue to play a role if and when required by the rural industries.

What has increased in importance is the training of managers within the agricultural industries. One of the prerequisites for successful adaptation is people who can lead in the change process. This often means new skills and new attitudes and over the last two or three years MAF has been developing expertise in this area. More and more we have been aligning our courses in places like Flock House towards training managers in agriculture. This training has often taken the form of developing management and personal relations skills rather than practical skills which were often required in the past. The emphasis is changing from doing to thinking.

Let us look now at "user pays". MAFTech's role must now be carried out in a new economic environment. Few who have been close to the agricultural scene over the last two years do not know of the changes which have taken place in government funding. MAF is on a net government funding programme through to 1991. This programme requires the Ministry to increase its revenue earning capacity to some $50 million per year. MAFTech is required to make its contribution. Details of how this affects MAFTech are shown in Table 3. If the present funding targets are maintained, MAFTech will need to make approximately $20 million a year by 1991 or reduce

Table 3. Revenue targets for MAFTech (1987 $m)

86/87	87/88	88/89	89/90	90/91
1.754	1.788	2.284	5.250	5.000

Total extra revenue required per annum by 1990/91

to stay at same size will be **$16.076 m**

Note: These are *indicative figures* only. They are based on required MAF reductions, and therefore depend significantly on forecast reductions being attained in other areas of MAF.

in size. It is MAF's intention to earn this revenue so the very important research and development core which we believe the land-based industries will require to cope with the future can be maintained.

This is not to say that we will be totally funded from revenue. Even by 1991 government will be funding MAFTech by approximately 70% of total expenditure. It does mean however, that clients and people with whom we deal will see us in a much more commercial light. It is impossible to be half commercial, therefore we have adopted the stance that for individual services we provide, a full return will be required. That is, staff within MAFTech are now being required to fully cost out each service including overheads, salaries, operating expenditure and depreciation and price their services on a fully costed basis.

Experience to date in this new environment is somewhat ambivalent. In most cases the reaction from clients has been positive. Farmers and others in industry have been prepared to pay for what they believe they want or need, as long as they see value for money. Where we have been providing services where the value is not apparent, we

have had difficulty in recouping the cost of these services. Where this happens we are looking very closely at whether the service should continue. In some cases there may be a good social reason for the service. If such is the case, then it will. In others it is apparent that services we have provided in the past have not been needed or required by our clients. In such cases the service will be discontinued.

It will be important in this new environment for the managers in MAFTech to work closely with the managers in industry to ensure that the investment which industry has in MAFTech is being sensibly directed. The responsibility for ensuring this takes place rests both with MAF and with industry. One of our goals over the next few years is to ensure a much closer formal relationship exists between the various industry sector groups and people in MAFTech. It is only in this way that we can be sure the directions which should be followed to ensure industry maintains its international competitive edge are identified and strategies worked out for change.

Over the initial working-in period, we have had to overemphasise our need to collect revenue. This has been necessary to ensure we were reasonably successful in reorienting the attitudes of staff towards what had been in the past a largely no-go area. It is unlikely that this overemphasis will last longer than this financial year.

In spite of some initial nervousness, there has been no endangering of important long-term science programmes. This does not mean that some science programmes will not be discontinued. Reorientation of some programmes will be needed so that we can drop off those which are not needed or required, to fund priority areas which are being identified as being important for our future.

The changes in government policy which the existence of MAFTech now reflects, will lead to changes in the way MAF operates. Even for those of us in the middle of the planning of the future of MAFTech it is not fully apparent as to what these changes will finally mean. As

we move into a more commercial environment many things will change and they will change in a way which is not possible to foresee at this time. The effect of opening up the opportunities available to a group of highly inventive and highly trained people is to encourage inventiveness in new ways of doing things. The results already are intriguing and in some cases amazing. Hiring people to work in Queen Street and Featherston Street to capture the investment dollar from the cities is something we had not previously contemplated. It is now becoming a reality. Having a presence at major horse racing meetings is a novelty for us. Setting up joint ventures with venture capital companies is a new and exciting experience.

This does not mean that we will be losing our base in traditional agriculture. We will not. We still regard farming as our bread and butter clientele and the main reason for our being. What it does mean however is that new ways are being tried for bringing the rural areas and the urban areas together for the benefit of both. Many people in MAFTech are appreciating this opportunity. I hope others will also see the benefits and work with us to ensure that our land-based industries remain internationally competitive in the foreseeable future, contributing as much to New Zealand's well being as they have in the past.

Private farm management advisory services

Mr Graham Cooney*

In this paper I intend to give a brief description of the private farm management consultancy services in New Zealand with particular reference to the Society of Farm Management of which I am currently national president. Then I will comment on the problems that may arise for private consultants from recent Government moves into the "user pays" field. Finally, I will provide what are designed to be thought-provoking comments on where the future lies for consultants and their clients.

Society of Farm Management

Private agricultural consultancy is a relatively recent occupation which has grown considerably in the last 20-30 years. The Society of Farm Management was formed about 18 years ago to encourage a professional attitude in the occupation, to assist an interchange of information between extension people in both commercial and public spheres of the industry, to provide on-going training and to give potential clientele some protection in terms of conduct and standards. To further these aims the Society, in 1976, fostered a registration scheme within which those members offering themselves to the public on a fee-charging basis were required to be registered. This scheme gives the fee-paying client a guarantee of expertise and professional standards when employing a registered consultant and also gives them the opportunity to get disciplinary action taken against a registered consultant who has contravened ethics procedure or has

*Registered farm management consultant, Invercargill.

shown professional incompetence. A Registered Farm Management Consultant has to satisfy a Registration Board, made up of respected members from the industry and the agricultural universities, of their competence and ability to offer services to the public before they can be registered. They also need to obtain certain minimum academic and experience qualifications.

It should be emphasised that the membership of the Society of about 800 includes a significant number who are employed by Government departments servicing agriculture. About 170 of the Society's members are registered and some of these are also employed by these departments. The remainder of these registered consultants are offering their services to the public in a professional capacity for a commercial employer or in self employment.

Recent changes to consultancy

I believe I speak for the majority of private consultants when I say that we welcome the change to charging for government department advisory services. Overall I believe it will lead to an improvement in the standard of service available to the public. From personal experience with both the MAF and in private practice in the same province I can categorically say that the clientele firstly demand and secondly get a much improved service under a "user pays" approach. If they do not then the provider of the consultancy services goes out of business.

The above comment leads me to the few reservations I have about the changes that have occurred. I do not believe that a Government consultancy service, which has to fund only part of its affairs from consultancy income and which has also got some statutory obligations to the Government, can provide fair competition to its competitors and also provide reasonable terms of employment to its employees. If it is also working in tandem with research stations which are also partly publicly funded the situation becomes even less tenable.

The problems that need to be resolved include the following.

Access and cost of research
Research has been carried out over a number of years and until recently that done by MAF has been almost completely Government funded. There must be a guarantee that future or past research funded by the public is freely available to all possible users. There have been suggestions that not only will all research be charged for but it might also only be available to the MAF consultancy service thereby giving them a commercial advantage. There is no problem with that advantage when the research has been fully funded from other than the public coffers, but a very real grey area is evolving for all involved in the industry with relation to that research.

Ethics
There are very real problems, not of their own making, for the MAF staff in terms of ethics under the present situation. Where their services are partly funded by the State, how do you reconcile an offer of cheap or free initial services in order to gain long term commercial clients. If an individual consultant or a fully commercial organisation does this there can be no complaint because that is a commercial risk that may or may not be successful.

However, if the organisation is not fully client funded the commercial risk may not exist and ethics becomes involved.

A second example may include the use of information gained by staff from their statutory obligation in assisting Government and them selling this information before legislation changes are readily available to their commercial counterparts. Again there are no reservations about Government organisations selling information in competition with their opposition but only after that information is available to all parties. Any other system is akin to insider trading.

When making these remarks any concerns that are being raised are on behalf of both private and public advisory personnel. Any disadvantages to private consultants from this situation are obvious but these issues also provide problem areas for the MAF personnel, the most competent of whom will also be hamstrung by antiquated attitudes to their remuneration under the Public Service system.

Any solution would almost certainly involve completely privatising the MAF commercial services and keeping those services separate from a research facility that was not also completely privatised.

Future prospects

The history of advisory input into agriculture covers two major aims in the last 20-30 years. The first of these involved a production push which in the 1960s and 1970s was encouraged by Government policies and was very successful. In the late 1970s and early 1980s a gradual backing away from those policies led to the push for a reduction in farm costs while maintaining output. Arguably the efficient farmers have now got close to the extreme possibilities in both production and cost cutting. The present Government policies will push the agricultural industries in a new direction - that of obtaining a better price for the products they are producing. One of the major components of this process is to produce a product that is required by the market and at a time when the market requires it. Arguably this has been the major strengths of the dairy industry. The marketers are able to work with a reasonable degree of certainty when trying to assess the future quality and quantity of raw product they will be working with. Other traditional industries are the opposite, some almost ludicrously so.

Competent consultants are going to be involved in this process and it may require some changes in attitude from them. In the past it has been important to be independent in terms of advice to farmers concerning how they marketed their produce. In a climate,

encouraged by both Government and farming politics, of aiming to keep every farmer in business (and thereby ensuring that the efficient farmers were never suitably rewarded) this independent policy was sensible. In the future, a consultant while still remaining independent, may have to work alongside one efficient processing and marketing outlet. This would enable him or her to receive the correct message concerning that company's requirements and by working with their competent clients help them provide the correct quality product at the required time. This will (a) allow the farmers to get the correct message well in advance, which is the opposite to what has happened in some of our industries in the past (b) give a better chance of the farmer getting a fair share of the industry profit (this will be a major battle for farmers in the next ten years) and (c) give consultants a better chance of job satisfaction and a suitable reward for the competent. The last of these is very important and again highlights the problems of MAF which, as an organisation seen to have a Government tag, may find difficulty in a situation where they have to take sides.

Change will occur rapidly in a freer, more competitive world where the half life of knowledge is considered to be a maximum of five years. Farmers and their advisers who are unable to respond to the sort of change suggested in this paper will not cope. On the other hand those that are competent and not resistant to change will be well rewarded both financially and personally - and after about 30 years of the opposite to that, it is about time.

Why is fine wool worth more?

Professor Don Ross*

In this paper I propose to concentrate on technical reasons why fine wool is worth more, but firstly I will present some data on the inter-relation of wool fineness, price and quantity.

Price, fineness, quantity relationships

The relationship between fibre diameter, expressed in microns, and auction price has been relatively stable over many years. Figure 1 illustrates the relationship for full length fleece wool sold at auction July 1986-April 1987.

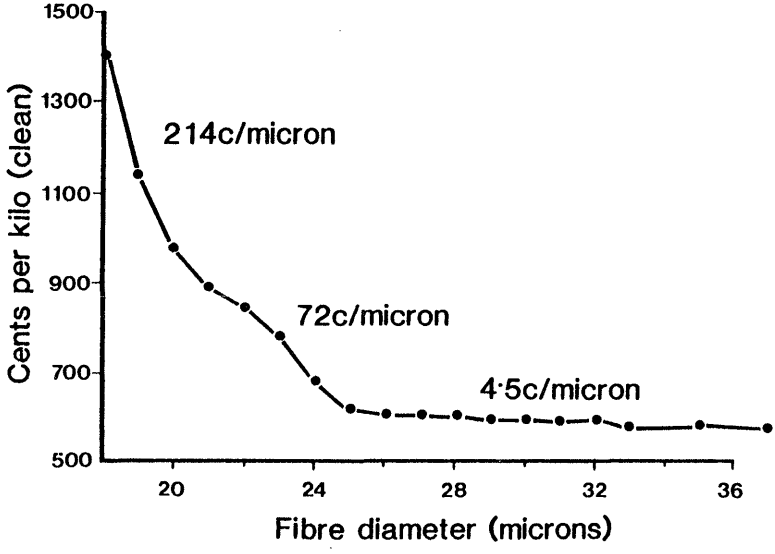

Figure 1. The relationship between fibre diameter (microns) and auction price for Australian fleece, July 1986-April 1987

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- From 37 to 25 microns clean price increased slowly, 4.5 c/micron.

- From 25 to 20 microns there was a more rapid increase in price, 72 c/micron.

- From 20 to 18 microns, the price for very fine Merino increased by 214 c/micron.

In the 1985/86 season some 6,918 bales finer than 20 microns were sold at auction representing 0.4 percent of the New Zealand clip.

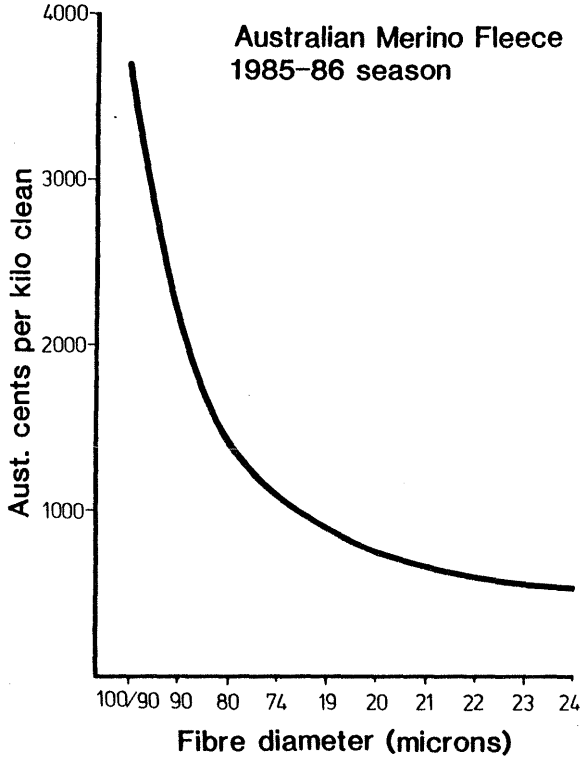


Figure 2. Prices of Merino combing fleece 1985-1986

In Australia a similar price/micron relationship holds. Figure 2 illustrates the prices of Merino combing fleece of Choice, Superior and Spinners A and B styles for the 1985-86 season. It should be noted that the Australian Wool Corporation uses quality number in grading wools finer than its 18.6-19.5 micron grouping. The finest wool 100/90s averaged $A37/kg, the price decreasing rapidly for 90s to $A21 and 80s to $A14.

Table 1. Australian Wool Finer than 20 microns

Quality Number /micron	Spinners Bales	% of Clip	Total Clip Micron	% of Clip
100/90	27	0.001	-	
90s up	566	0.019	-	
80s up	1079	0.036	17	0.3
70s up	3514	0.119	18	1.9
18.6 - 19.5	8975	0.304	19	5.2
Total	14 161	0.479		7.4

Table 1 shows that there were 27 bales of 100/90s but 8,795 bales of 19 micron spinners wool. These five wool groups represented 0.48 percent of the Merino clip. However, as also shown in Table 1 these top quality spinners wools represent only a fraction of the 7.4 percent of the Australian clip which is finer than 20 microns. The rest of the fine wools are mainly down graded for vegetable matter contamination and other wool faults. Many are too short for a spinners type.

Figure 3 illustrates the percentage of wool in different micron groupings for the four International Wool Secretariat countries, New Zealand, Australia, South Africa and Uruguay. These countries produce 80 percent of the wool traded internationally. It can be seen that some five percent of their total wool production is finer than 20 microns and 50 percent is between 20 and 25 microns. New Zealand Romcross and other types coarser than 35 microns make up only 18 percent of the total.

This five percent of fine wools represents some 45 m.kg of clean fibre and as shown by Australian prices it is not until fibre diameter is finer than 18 microns that there is a very marked increase in value.

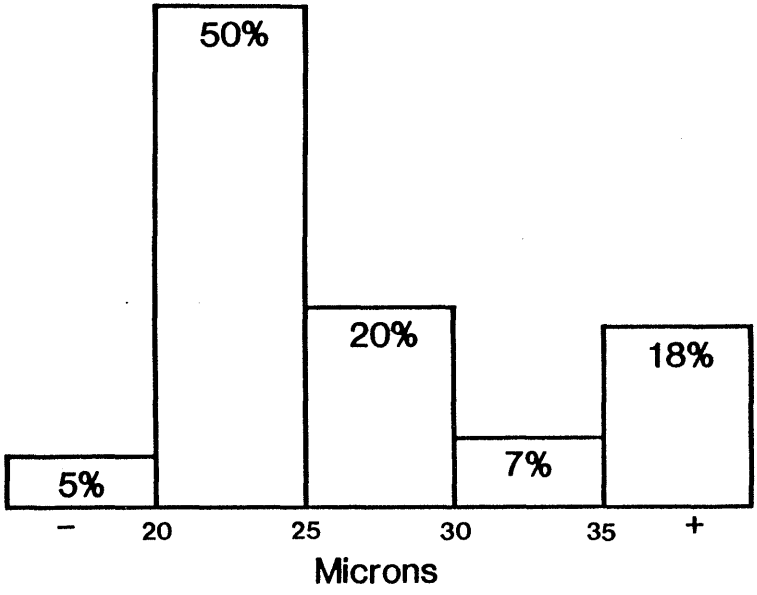


Figure 3. Fineness of wool grown in New Zealand, Australia, South Africa and Uruguay (80% of wool traded internationally)

Fibre diameter, cross section, linear density, tex

While wool producers and marketers talk in terms of fibre diameter, from the point of view of wool processing it is the cross-section or linear density of the fibre which is important. You will remember from your school days that the area of a circle is $\pi . r^2$ or $\pi . d^2/4$,

that is as diameter increases the cross-sectional area of the fibre increases as the square of the diameter. The most useful measure of the cross-section of a fibre or yarn is its linear density expressed in tex units. That is, the weight in grams of a 1000 metres of fibre or yarn. Table 2 shows the fibre diameter, cross-sectional area and tex values for fibres covering the range of wools of normal mean diameters.

Table 2. Fibre diameter, cross-section, and linear density

Fibre micron um	Diameter ratio	Fibre Cross-Section micron^2 um^2	ratio (d^2)	Linear density tex g/1000m	ratio (d^2)
15	1.0	177	1.0	0.23	1.0
20	1.3	314	1.8	0.41	1.8
25	1.7	491	2.8	0.64	2.8
30	2.0	707	4.0	0.92	4.0
35	2.3	962	5.4	1.26	5.4
40	2.7	1257	7.1	1.64	7.1
45	3.0	1591	9.0	2.08	9.0

As fibre diameter increases three fold, from 15 to 45 microns, cross-sectional area and linear density increase 9 fold. This is shown in Table 2 as a ratio compared with the value of the 15 micron fibre. It should be noted that cross-sectional area and linear density have the same relationship to fibre diameter. As wool processing is a textile industry rather than a farming operation it is preferable to use the textile term tex which applies equally to single fibres, yarns, slivers or other textile assemblies. Given time the wool sold in New Zealand may be classified like other textile fibres on the basis of tex units rather than microns.

Fibre fineness and spinning limit

There is a general trend in world textiles towards lighter weight fabrics. Fibre fineness, and the processing system, determines the tex values or fineness of the yarn which can be spun from a wool. This in turn determines the

weight of the fabric which can be woven from the yarn, and that largely determines the value of the wool.

Table 3. Fibre diameter, linear density and the finest woollen and worsted yarn count

Fibre diameter	Linear density	Finest worsted yarn (40 fibres in yarn cross-section)	Finest woollen yarn (110 fibres in yarn cross-section)
microns	tex (g/1000m)	tex (g/1000m)	tex (g/1000m)
15	0.23	9	25
20	0.41	16	45
25	0.64	26	70
30	0.92	37	101
35	1.26	50	139
40	1.64	66	180
45	2.08	83	229

Spinning limit, that is, the finest yarn which can be commercially spun from a given weight of any clean wool requires there to be a minimum of 40 fibres in the cross-section of a worsted spun yarn and some 110 fibres in the cross-section of a woollen spun yarn. These minimum numbers of fibres are totally independent of fibre diameter.

Table 3 shows the yarn counts in tex of the finest commercial yarns that can be made on the worsted and woollen systems with 40 and 110 fibres in the yarn cross-section respectively. Considerable quantities of very fine wools are made into fine count woollen yarns of 60 tex or less, often as blends with other fine fabrics such as cashmere, for high quality women's knitwear.

Suppose a worsted manufacturer wishes to make three fine yarns of 20, 15 and 12 tex, what wools could he use. Figure 4 illustrates the relation between raw wool mean fibre diameter and the number of fibres in the yarn cross-section for each of these three yarns.

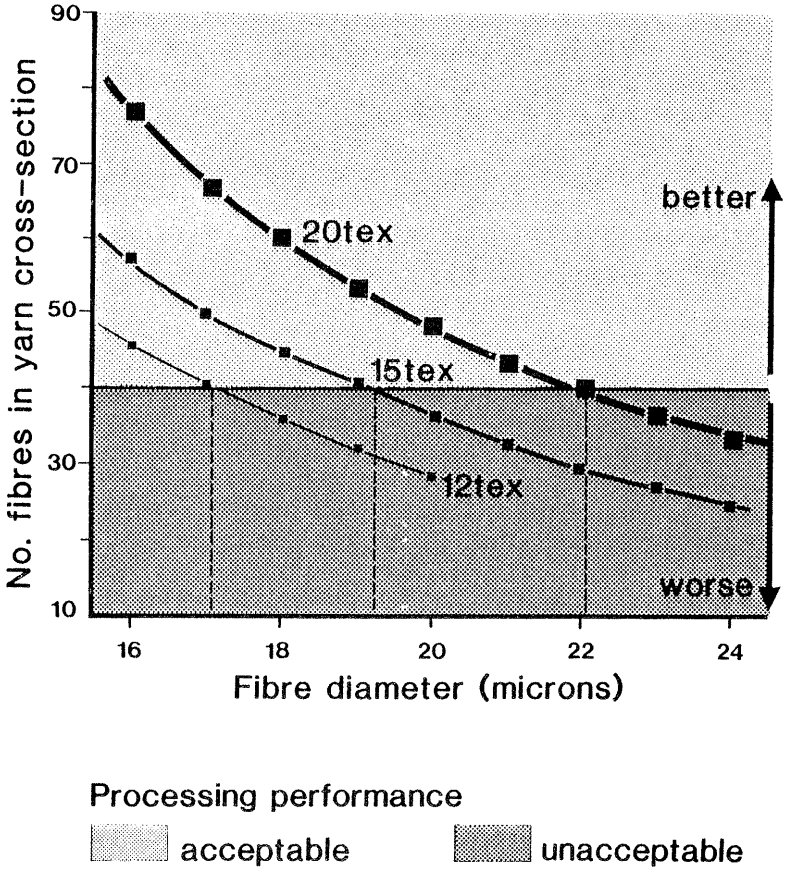


Figure 4. The relationship between raw wool mean fibre diameter and number of fibres in yarn cross section

With less than 40 fibres in the yarn cross-section, processing is not commercially viable. As fibre numbers increase above 40 processing becomes increasingly more efficient.

The 20 tex yarn could be manufactured from 22 micron wool with 40 fibres in the cross-section although the manufacturer may prefer to buy 21 micron wool to ensure that his processing was trouble free. With 18 micron

wool he would have no problems in processing a 20 tex yarn but the cost of the raw material would make his yarn costs uncompetitive. He could not spin 23 micron wool to make a 20 tex yarn.

For the 15 tex yarn, the manufacturer would need to buy 19 micron or finer wool while for the 12 tex yarn only 17 microns or finer wool could be used to make such a fine yarn.

Handle

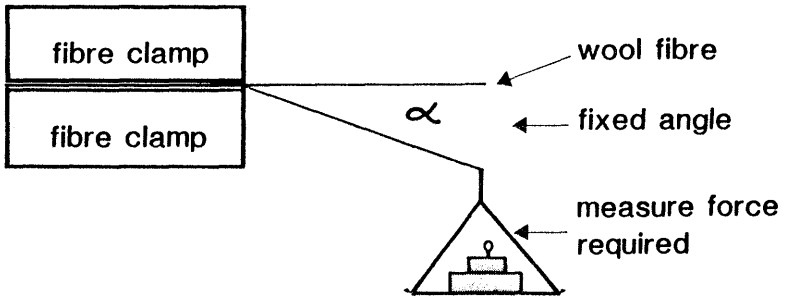
Of prime concern to a customer buying an expensive fine wool product is its handle. Product handle is determined by many factors including, the fineness of the wool, fibre crimp, the yarn making system, the amount of twist in the yarn, the fabric characteristics together with the manufacturing and finishing treatments.

Processing effects may totally mask the influence of fibre diameter. However while a very fine wool can be made into a textile product with poor handle, it is more difficult to make a coarse wool into a fabric with a soft handle and impossible to make it into a light weight fabric.

The handle of a 19 micron light weight worsted suiting would be smooth yet firm while a 19 micron woollen sweater would feel less smooth, but would be softer and more resilient. The handle of both products though different would be commercially acceptable.

The fibre property which is most important in determining handle is the fibre bending modulus. That is the force required to bend a fibre through a given angle. This is illustrated in Figure 5 and values for a range of wool fibres given in Table 4.

Fibre bending modulus increases very rapidly as fibre diameter increases. While tex increases as d^2 bending



Fibre bending modulus

Figure 5. Fibre bending modulus

modulus increases as d^4 so that as shown in terms of ratios in Table 4, the force required to bend a 45 micron fibre is 81 times the force required to bend a 15 micron fibre, through the same angle. Figure 6 illustrates how fibre bending modules and tex rapidly increase with increase in fibre diameter (Tables 3 and 4).

Table 4. Fibre diameter and bending modulus

Fibre diameter microns	Bending modulus ratio (d^4)
15	1.0
20	3.2
25	7.7
30	16.0
35	29.6
40	50.6
45	81.0

Considering only mean diameter for wools may be misleading as the variability of the diameters of fibres within a sample can be very important. Figure 7 and Table 5 illustrate normal fibre diameter distribution for three wools.

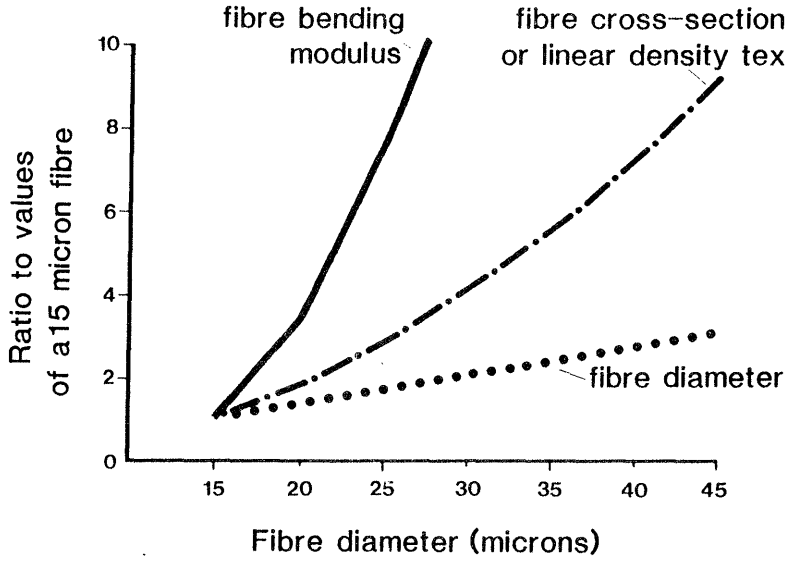


Figure 6. The relationship between fibre diameter, fibre bending modulus and tex

The finest fibre in the superfine Merino would be about seven microns the coarsest in the strong Romney 62 microns. As shown in Table 5 the bending modulus ratio of a 62 micron fibre is more than six thousand times higher than the force required to bend a 7 micron fibre. As shown in Table 5 the small 2 micron difference between a 7 and 9 micron fibre, the finest in the fine Merino sample, results in an increase in bending modulus ratio of 2.7 times.

Prickle

Prickle is another aspect of handle which is related to the bending and buckling modulus of a fibre and is therefore related to fibre diameter. The shape of the end of the fibre, pointed or blunt, and the properties of the textile fabric all affect the level of, or the perception of prickle. The length the fibre protrudes

above the fabric surface and their number of fibres is also very important.

For example many very high grade furnishing moquettes with a 3-5 mm pile height are made from 30-34 micron wool and have a very acceptable handle. Similarly some blankets made from 35 micron wool with a 25 mm pile height have a very acceptable handle. However a small proportion of 35 micron wool in a fine woollen sweater will no doubt make it quite unacceptable to wear next to the skin.

Table 5. Data on fibre diameter variability, linear density and bending modulus for 17, 20 and 37 mean fibre diameter wool

	Super fine Merino	Fine Merino	Strong Romney
Mean fibre diameter microns	17	20	37
Finest fibre diameter microns	7	9	14
Coarsest fibre diameter microns	27	38	62
Range within sample microns	20	29	48
Mean linear density ratio	1.0	1.37	4.67
Bending modulus ratio			
Finest fibre "	1.0	2.7	16
Coarsest fibre "	22	868	6154
Mean diameter "	35 (1.0)	67 (1.9)	781 (22.3)

Referring to Figure 7 it can be seen that even in apparel fabrics made from Merino wools in the 20-24 micron mean diameter range, these will be fibres with diameters in the high 30s and 40 micron range. It is these fabrics which can cause prickle.

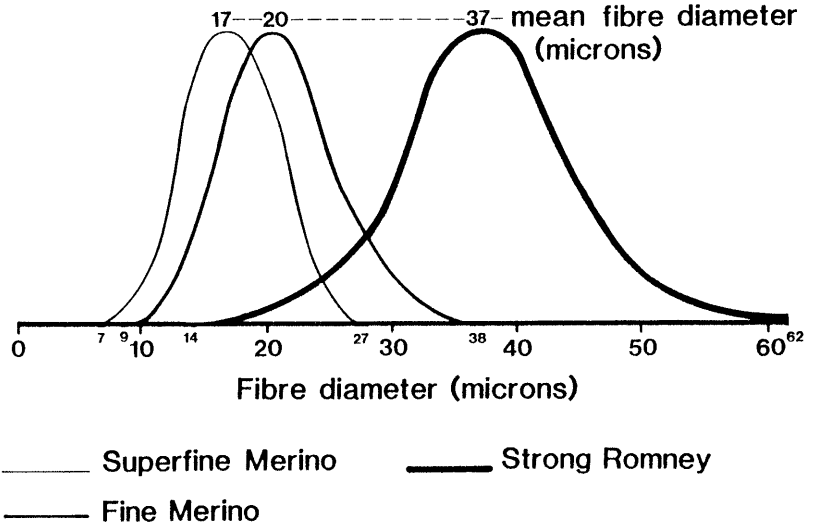


Figure 7. Fibre diameter distribution for three wools

In practice fine worsted cloths are usually finished by singeing with a gas flame. This forms a bead on top of protruding fibres and reduce prickle. However it is not feasible to singe fine woollen apparel fabrics.

Conclusion

There is an increasing demand for light weight, high quality, luxury wool products. Such products require fine yarns which in turn creates the demand for fine wools. Fibre diameter or more correctly, fibre linear density determines how fine a yarn you can spin from any given wool. Fibre diameter also determines the fibre bending properties which in turn play a major role in determining fabric handle or the incidence of prickle.

It is these characteristics which are of major importance in terms of customer satisfaction in the sale of expensive fine wool products. Therefore, it is for these reasons that fine wool is worth more.

Environmental reforms

Dr John Hayward*

Introduction

In this paper I should like to review the origins of, and the reasoning behind reforms to both economic policy and the institutional arrangements for managing environmental resources.

Because the general character of the new agencies is known to you, and will be addressed by other speakers, I should like to focus on some of the implications of recent changes rather than on the changes themselves.

In addition I should like to note that, in my opinion, the reform process has only just begun. I believe that major changes will be made to our procedures for water and soil management, town and country planning and local government. These changes will have important implications for hill and high country land owners, lessees and users.

The origins of change

None of us should believe that the reasons for recent changes to New Zealand's social and economic order are unique to New Zealand. If you accept Drucker's (1986) argument, recent changes in New Zealand are but a small part of changes which are occurring internationally.

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Drucker argues that the origins of change lie in a weakening of:

- economic relationships between primary products and industrial products;

- traditional relationships between industrial production and employment;
  and,

- relationships between capital movements and trade in goods and services.

Be these as they may, within the New Zealand context, changes to economic policy and to the administration of natural resources were clearly signalled in four publications.

- "There has to be a better way" authored by Roger Douglas and published in 1982.

- "Economic Management" prepared by the Treasury and published in 1984.

- "Economic Management - Land Use Issues" prepared by the Treasury and published in 1984,

- The Labour Party Manifesto, released in sections in April/May 1984.

The Labour Party Manifesto notes (inter alia): "Labour recognises that the fundamental purpose of a sound environment policy is to ensure the management of the human use of the biosphere to yield the greatest sustainable benefits to present generations while maintaining potential to meet the need and aspiration of future generations".

Notwithstanding the Labour Party's proposals for environmental reform, and the sheer hard work of those who have been engaged in the reform process, I believe that recent changes were made possible by the

Government's economic policy, foreshadowed in Douglas (1982) "There has to be a better way."

In that book, Douglas argued that productivity in the services sector had increased in recent decades, but by only a very small fraction of the growth that had been recorded in "productive" sectors. Douglas's clear message to Departments of State was to clarify their line of business. Where state agencies had commercial objectives they should be required to perform in a fully competitive commercial environment. Where their objectives were related to public service, the agency should be structured so as to deliver those services with the greatest possible efficiency and effectiveness.

The essential objectives of reform were summarised by Deane (1986) as:

- clarification of objectives, especially between commercial and non-commercial functions;

- enhancement of the adaptability and responsiveness of the public sector to change;

- decentralisation of controls in order to encourage managers to manage;
  and,

- improved accountability mechanisms and the need to review the mix of incentives and sanctions for public sector managers.

The combined effect of the new approach in economic policy, environmental policy and public sector restructuring was that the Government announced in September 1985 proposals for new institutional arrangements that would include:

- a Ministry for the Environment;

- a Parliamentary Commissioner for the Environment;

- a Department of Conservation;

- a Department of Survey and Land Information;

- a Forestry Corporation; and,

- a Land Development and Management Corporation.

It was subsequently announced that a Ministry of Forests would be established for specific purposes including research, and that a Department of Lands would be retained beyond 1st April 1987. The need for this department was created, in part, by the Government's decision to retain Pastoral Lease lands in Crown ownership, at least for the time being.

The implications of change

The broad character of the new agencies is known and is presented in the empowering legislation of each. While much of the detail relating to objectives, methods of working and responsibilities remain to be clarified we know enough to be able to consider some of the implications for hill and high country land owners and lessees. I should like to draw attention to three aspects.

1. Profits and rentals

At present the intention is that Landcorp will act as the Government's agent for the management of much pastoral land. It will collect the rentals and in turn be paid for its services. While the relationship between the returns from rentals and the costs of their recovery may be of little concern to the agent, I believe this matter will be of increasing concern to the government's economic advisors. In addition I believe that, they (the economic advisors) will want to develop a consistent and even-handed approach to all rentals and not just those from Crown land. As things stand at present, the rents payable for land depend on the use that is made of the land, and the rents payable for the use of other resources depend on the resource (for example rents are not charged on the recovery of gold but are charged on the

recovery of fish). While these inconsistencies may be explained in historical and other terms I believe that rental reviews are an inevitable implication of recent reforms. For the moment the important feature is, that, if lessees are to be involved in the rental review process, I believe that the quality of their arguments will need to be markedly superior to some of those of the past.

2. Values

For more than one hundred years the use of pastoral lands has been dominated by a preference for pastoral use. But the avalanche of prosperity which engulfed New Zealand in the mid 1950s led directly to other clearly articulated preferences or priorities for the use of our hill and high country. Thus we now find individuals and groups whose prime interests lie not with pastoral production but with recreation, tourism, nature conservation, soil and water conservation, forestry or landscape protection.

Recent reforms provide the opportunity for those who are less concerned with agriculture and more concerned with other values, to promote their views and develop strategies for having those values taken into account.

How differences in values are to be resolved or reconciled is not yet clear. However the recent High Court judgement in the matter of the Huakina Development Trust's appeal against the Waikato Valley Authority is a clear signal that in future the preferences of individuals and groups within society (other than just farmers) will receive more rather than less attention.

3. Conflict

A third implication of recent reforms is that as land owners and lessees you will be dealing with a larger number of agencies in the future than you have been dealing with in the past. Although this, of itself is a matter of little significance, the problem will be that agency representatives will be much more single purpose single minded in future than they have been in the past.

The question will become, "How are conflicts between uses or proposed uses to be reconciled?"

I believe that if we are to rely on former mechanisms (i.e. Parliament, the Courts, District Schemes) the recent reform process will have accomplished little. If we are to capture the potential benefits of our new institutional arrangements then we must develop new and creative ways of dealing with conflict.

The Tussock Grasslands and Mountain Lands Institute has a potentially important role to play in the resolution of conflict and in the development of coherent policies for the use of hill and high country. The Institute has agreed to major changes in its membership and its operations. However, before the Institute can be an effective agency for conflict resolution its role needs to be clearly understood by all parties and its authority confirmed. At present, this role for the Institute is the subject of a review; the results of which I hope will be known within three to four months.

There are other implications of the Government's reforms for the management of hill and high country but for the moment I believe these three issues to be the most important, viz.

- probable changes to rentals and rent fixing procedures;

- taking account of a diversity of values; and,

- resolving conflicts between the aspirations of single purpose agencies.

Future reforms

Regardless of which political party forms a government I believe that the reform process has only just begun.

Because my name is not Simon Walker and because it would require a huge leap of imagination to believe that I

was a consultant to the Government in the setting of their agenda I should like to indulge in five minutes of speculation on the nature of some possible future changes.

Town and Country planning
The Town and Country Planning Act is the principal piece of New Zealand legislation which controls changes to land and resource use. For fifty years we in New Zealand have, as elsewhere, used this Act to zone, licence or otherwise regulate land and water use. It is this plethora of regulations which have led to many complaints and repeated calls for reform.

Local Government
Since the abolition of the provinces in 1876 we have developed a system of local government in this country of ever-increasing complexity. Visitors to this land of three million people must wonder at our obsession for governing and being governed.

For example we have:

231 Territorial Authorities
135 Community Councils
22 United or Regional Councils
209 Special Purpose Authorities
470 Statutory National Boards and Committees

No fewer than five Local Government Commission's have, without success, recommended various measures for reform. However, I think it reasonable to assume that the current Ellwood Commission will result in smaller boroughs and counties being amalgamated into fewer larger metropolitan regions. Such reform would clearly require subsequent changes to the structure and functions of Regional and United Council.

Weed and pest management

In recent years Government agencies have been spending in the order of $15-20 m annually in pest control and related activities. While most of this cost has been met

by taxpayers it has been argued by some that a disproportionate share of benefits have been captured by relatively few private individuals or local communities. For this and other reasons there is at present an active debate as to the future administration of pest control at a national, regional and local level.

While there are a number of possible arrangements, one scenario could involve a much more selective use of public funds made available to regional authorities for the express objectives of land protection where this was shown to be of national rather than private benefit.

Catchment Boards and Regional Water Boards

The changes announced in the Government's recent Budget that relate to rating and the method by which the Government will make finance available to catchment authorities imply major changes to the future regional administration of land and water. Given the long-standing problems of interpreting the long title of the Water and Soil Conservation Act (1967) and the widespread dissatisfaction with the 1981 Amendment, no one should be surprised when the Water and Soil legislation is subject to radical review.

The outcome of reforms to procedures for town and country planning, local government administration, soil, water and pest management together with reforms to other resource related statutes such as the Mining Act, is a matter of speculation.

One scenario could result in a small Ministry of Crown resources with catchment authorities emerging as the regional authorities for natural resources planning, management and administration.

Whether or not such an outcome is possible is, for the moment not particularly important. The important point is, that there is, I believe clear evidence to indicate that the reform process has only just begun. The question is, "what will be our response to that?"

Three years ago the present Government began a reform programme and promised consultation as part of that process. Despite the cynicism and criticism from some, I believe that promise has been honoured. I think it reasonable therefore to believe that consultation will be a feature of future reforms.

However consultation brings with it problems for those who have tended to make use of political patronage to achieve their objectives. Effective as political patronage might once have been, it is clearly likely to be much less effective in an environment in which consultation and professionalism are key concepts.

One of the new problems for those land owners and lessees who in future wish to engage in the consultation process will be that their arguments and propositions will need to be presented in a more professional manner than was perhaps once the case.

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D.O.C. — Structure and function

Philip T. E. Woollaston, M.P.*

If I were to discuss the structure of DOC as it is today, you might find in a few years time that that structure has changed, and in fact I hope you do. Because in the early stages of a Department there should be a degree of flexibility. As needs are foreseen and redundancies discovered it should be possible to move resources around. The structure of a Department, in my view, should be the physical on-the-ground response to its functions.

The most important thing about DOC is that it is largely decentralised. It has a small head office, which is there for the purposes of administrative servicing, and policy advice to government. It contains a number of specialist directorate's which are not repeated throughout the country. It has also, as its major operating arm, eight regions and 34 districts which are parts of those regions. Each of those has its own administrative structure. To a degree the structure reflects the bureaucratic orthodoxy of the State Services Commission although I think the Commission would have had a far smaller number of regions and a much more "top down" management system. I believe once DOC has had a year in operation, once the policies within it and the means of implementing government policy are well established, then it will be discovered that there is room for greater decentralisation.

I can see two avenues for that happening. The first is by pruning the head office administrative resources to the minimum required for ministerial servicing, for central policy formulation and for the integration of the regions,

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and putting as much on-the-ground administrative resource under the regional offices and district offices as possible. The second way in which I think the "top down" effect can be reduced, is by dispersing some of the specialist units, such as the research unit, to more appropriate, and possibly less expensive locations than Wellington. But these are not the sort of thing one would try to do in the first few months of a Department's existence.

The origin of the DOC arose from the perceived need for a nature conservancy, a major conservation division within a Ministry for Environment. After the election in 1984 it was suggested that it would be necessary to create a MfE in two stages because to take on both planning and policy aspects and nature conservancy was too much to do in one hit. It seemed appropriate to set up a policy planning and monitoring side of the Ministry first. The response from a wide range of groups was that it was inappropriate to delay the establishment of a nature conservancy. The 1985 Environmental Forum looked to establish two agencies, distinct from each other; the Ministry for the Environment, to deal with the planning and policy advice and the monitoring of the environmental effects of policies etc. and the Department of Conservation. After extensive consultation cabinet took that decision. Now the taking of that decision wrote a rather different agenda for nature conservancy in New Zealand. It expanded the horizons for the agency considerably. It was no longer to be one wing of a department with a wider and different mandate. So 1986 saw a lengthy debate, both public and within government, over the proper range of functions and responsibilities for the Department of Conservation. That debate will be seen in retrospect as a major contribution to the shape of New Zealand over the next few decades.

I want to look a little more closely at that debate. I think it is important to realise why the concept of a DOC was in fact supported so widely within government by ministers and departments with a wide range of responsibilities. It didn't indicate that there had been a sudden bright light on the road to Wellington and that all

ministers and all departmental advisors had become instant greenies. It reflected the fact that underpinning the concept of the DOC was the idea of separating conservation and preservation objectives from production objectives. It involved a recognition that that concept is as important to production and productive interests as it is to conservation interests. So the debate as to what should be the functions of the DOC and what should be its range, became much more than the expected and predictable territorial debate between bureaucrats. It became, in effect, a debate over which resources and which types of resources should be regarded as predominantly productive or exploitable, and which should be regarded as resources to be preserved or conserved in the public interest. The result of that was a number of decisions taken over a period of about twelve months, which I think are historic in many cases and which will provide lasting solutions to arguments which have been going on for some time.

The most significant amongst them, perhaps, are the debates which took place over what should be the administrative future of Crown pastoral lands, particularly the pastoral lease lands, and what should be the administrative future of Molesworth. I think we will look back later and see alongside those, the debate over whether the DOC should have a significant role in the coastal zone, as manager of N.Z's coast line and some aspects of coastal waters and the debate over the future of public access to public lands and the future administration of marginal strips.

By far the greatest intensity of feeling surrounds the question of the administration of high country land. Frequently that debate focused attention on whether lands should be regarded as productive or as conservation lands with little or no productive value, in terms of primary production. It occurred I think, because the debate came to involve elements of our national identity. It became, to a degree a symbol of what I see as a rather wistful self image as a nation of hard bitten jokers and wide open spaces. I think we do see ourselves as a country of

rugged individualists in bushshirts in a country of rugged mountain peaks. We do have a lot of rugged individualists in bushshirts, but I don't think that they are a majority of the population. So the debate from the public's perception became one that involved not just the use of or access to public lands; it also became a debate about the preservation of a valuable part of our national self image, our national identity. I don't want to suggest though, that only those that live in towns and look through their centrally heated windows at the Southern Alps have any sort of emotional attachment to that land. Those involved in production from that land identify just as strongly with it collectively and I think much more strongly as individuals. They become, in a good sense of the word, very possessive of the land. I think the symptom of this has been the increasing identification of Crown lessees as "owners" of their farms and the land they lease.

The lessee's rights in Crown leasehold land have by custom, grown from their original contractual obligation which was entered into. If you disagree with me on that I invite you to consider the price at which leasehold properties have changed hands in recent years and the escalations in those prices. At the same time there has been a corresponding erosion of the perceived public property rights in leasehold land.

What, then, is this 'conservation' which has aroused so much suspicion amongst those from high country land?

Conservation, as it is defined in the Conservation Act, involves two activities, preservation and protection. They are similar and related, but not identical. And they are carried out for four reasons: Because of the intrinsic values of that which has to be preserved; to allow for public appreciation of (and that doesn't necessarily mean walking on it); to allow for the recreational enjoyment of it, (and that frequently means walking on it) and to safeguard options for future years.

The principle functions of the DOC as contained in Section 6 of the Conservation Act are:

- to manage for conservation purposes, land and other natural historic resources;

- to advocate conservation of such resources;

- to promote the benefits of conservation generally;

- to prepare and disseminate educational material related to conservation;

- to foster recreation, (not just to allow it) where that is consistent with conservation; and

- to allow for tourism.

That is a very important list. It was not lightly arrived at; it was debated at great length in Cabinet Committees, and in Parliament, it was debated in great length in the Select Committee of Parliament which dealt with the detail of the Bill. The balance I suggest is very important - to manage, to advocate, to promote, to disseminate, to foster and to allow for certain things to happen. That list shows clearly the role of the DOC is a two-fold one.

DOC has a management role related to certain lands and other resources entrusted to it and it has advocacy, promotional and policy-generating responsibility for looking after the public interest in the public estate for the intrinsic values of that estate, to allow the appreciation of the estate, to permit recreation on it and to safeguard the future options regarding it.

In respect of most of the land which is entrusted to the DOC, there's no problem. Nobody has much argument with DOC looking after the land which has been put into one or other category of reserve. Or with it advocating increasing that estate. However, there has been some quite acrimonious debate as it relates to the 'mixed use

of public lands', such as the pastoral lease areas such as Molesworth and some farm parks. It's been very difficult for interests which are related to production from the land to accept that the DOC, with its promotional and advocacy role, also properly has a hand in the management of Crown pastoral lands.

The debate has perhaps come to a significant point over marginal strips. I have listened with interest to some individuals and groups who believe that marginal strips are to be confiscated from leases which have a freeholding right or from land which has freehold tenure or something akin to it. I can tell you that is not the case. It is true the Crown Law Office has pointed to a possible technical conflict between two parts of the Conservation Act and the State-Owned Enterprises Act. But they suggest it would be very easily fixed up by adding something like: "subject to section 64 of the Conservation Act" in section 24 of the State-Owned Enterprises Act. There is no way in which Government needs to be bound by a law draughtman's omission to put "subject to Section so and so" in a piece of law. We have a way of fixing that, it's known as Parliament and we can do that very easily if it proves necessary..

I want to stress that there is no way that the totality of the Conservation Act and State-Owned Enterprises Act can remove any property right which is currently held by any person. Section 64 of the Conservation Act is framed to state that in clear and unambiguous terms. What is important about that debate, is not whether or not a very minor amendment is needed to an Act of Parliament. What is important about it is the fervour with which some of those who have a personal interest or a sectional interest in productive use of land, have embraced the argument that there is something confiscatory about enshrining a successor to Section 58 of the Land Act, in the State-Owned Enterprises Act. It is unfortunate that we have allowed ourselves to get into some fairly bitter arguments on that point. It is crazy to suggest that you can't on the one hand, have a role of

advocating an outcome and on the other hand a role of managing the process which may or may not lead to that outcome.

I have no difficulty with Landcorp and Landcorp itself has no difficulty with its combined management role assigned to it by Cabinet relating to Crown and pastoral lands and its commercial farming mandate. It could be held that those two are in conflict. It has been held by some keen environmentalists that there is a conflict there, but by and large it was accepted by the country that it is quite proper for an agency which has a mandate to promote the farming use of land to also have a hand in managing a large Crown owned estate which has a major farming use, but has some other uses also. But it is important also to ensure that the guardian of the public interest for non-farming purposes is also involved in its management. It is what has been called the Molesworth solution which I think has been widely accepted. It does make sense to have two agencies with complementary mandates involved in the management of our public estate.

If we are going to make progress, I think we have to get away from the intellectual straight jacket of looking for the dollar interest all the time, of saying this interest is dominant here, therefore all other interests must be diminished in order to protect it. We should recognise the commonality of interest in our public lands - and that includes Crown pastoral leasehold land. We should acknowledge that there is a public interest, defined in law and a private interest defined in the contracts which are held by lessees. Both of these have to be safeguarded. We do this to a degree in respect of freehold land by accepting a complicated and at times restrictive system of town and country planning which does derogate from the rights of freehold owners of land. To say that we should not accept a degree of public interest in respect of our public owned leasehold lands is to harm the future, not only of the land, but of all New Zealanders.

My message to you is that we must not look to identifying the dominant interest in particular areas of public land, that we should look to define the range of interests in those lands and then to constructively seek solutions which will encompass that full range of interests rather than end up with winners and losers. Solutions, particularly relating to property rights, which produce winners and losers, ultimately result in everybody losing.

Landcorp — Structure and function

Mr Peter Egan*

Landcorp was set up in 1987 to handle the government's commercial farming and land management operations which were formerly managed by the Department of Lands and Survey. It is one of the three organisations to spring from the restructuring of the Lands and Survey Department which had been in place for some 114 years.

The aim of Government's restructuring programme was to separate the Department's conservation functions from its commercial functions and eliminate the perceived conflict between the two. It also aims to ensure that its commercial functions are conducted efficiently and are transparent from any social functions.

The conservation functions were taken over by the new Department of Conservation; survey and mapping went to the new Department of Survey and Land Information and Landcorp took charge of the commercial and management activities. The transition from the Department to the Corporation, apart from the problems of land allocation have gone extremely smoothly.

Firstly, on the question of assets, Landcorp will have 142 farms with a total area of 354,000 hectares. These are the old land development blocks.

In addition it will administer 23,514 leases and licences covering a total area of some 2,656,000 hectares.

Other assets will be 3,682 parcels of unalienated Crown land with a total area of 72,000 hectares, 1,881 leases

*Deputy Chairman, Landcorp

administered on an agency basis for other Government departments and Local Bodies and 365 pastoral leases with an area of some 2,510,000 hectares on behalf of the Crown.

Landcorp will lease Molesworth Station from the Crown and will manage 13 farm parks, four Post Office farms, two Defence farms and one Health Department farm. Clearly we are going to have major responsibilities and major challenges before us.

Staff were originally fixed at 1,020, made up of 370 salaried staff and 650 farm staff. In actual fact, seven weeks after start-up we are some 50 to 60 salaried staff less than the proposed 370. This is mainly because more people opted for redundancy than we had envisaged.

Those who did this tended to be people who would not have difficulty in getting another job. Consequently we are short of accountants, computer experts and legal people. We are certainly not rushing to make up the shortfall and will probably finish up with a total staff of under 1,000, over two thirds of whom will be farm staff.

Structure:
The board is made up of the following people:

David Chalmers - Chairman of Landcorp. NZI Managing Director but retiring from that position in September.

Peter Egan - Deputy Chairman of Landcorp. Managing Director of Advance Foods, Founder of Lamb Roast Business and Chairman of N.Z. Meat Board subsidiary Freesia Meats.

Peter Elworthy - Immediate past-President of Federated Farmers.

Dan Duggan - Secretary of the New Zealand Workers' Union.

Jim Scotland - Business and Farm Consultant, Napier.

Brian Palmer - Canterbury farmer and long term member of the Land Settlement Board and a Director of Elders.

Susan Lojkine - Public accountant and a Director of BNZ.

George Moss - Dairy farmer from the King Country.

The Landcorp Board is serviced by a Chief Executive and a Corporate Executive of Assistant General Managers. It is managed in two Divisions which are Farming, the largest part of the Corporation involving some two million stock units, and the Property Division which is responsible for leases, licences, and mortgages on non-farmed and urban lands.

The business is managed in nine branches located in Whangarei, Auckland (which has no farming enterprise), Rotorua, Napier, Wellington, Nelson, Hokitika, Christchurch and Invercargill.

Our strategy is that decisions should be taken as close as possible to the action; mainly to ensure that prompt decisions are made. Consequently there will be wide authorities delegated down the line.

The N.Z. Maori Council Case

This is a very important and far reaching case. At the moment claims may only be made to the Waitangi Tribunal in respect of Crown land. Claims may not be made in respect of privately owned land, but perhaps illogically claims may be made against Crown land which was acquired by the Crown from private owners, even if this was only done recently.

Consequently there is concern amongst the Maori people that if Crown land is transferred to the new Government-owned Corporations that land will lose its

status as Crown land and, as a result, the Maori people may lose their rights in future to make such claims as they may wish to in respect of the ownership of that land.

Claims made to the Waitangi Tribunal prior to the passing of the SOE Act are recognised within the Act. Therefore, it is only the question of future claims that is worrying the New Zealand Maori Council and others.

The Stated-owned Enterprises Act provides in Section 9 that nothing in that Act shall permit the Crown to act in a manner that is inconsistent with the principles of the Treaty of Waitangi.

That section gives a status in law to the Treaty of Waitangi which, I believe, it has never had in the past.

This case was brought on the eve of the incorporation of the State-owned enterprises. A limited injunction was granted in the High Court; the matter was immediately rushed to the Court of Appeal where an interim injunction against any transfer of land to State-owned enterprises was granted. The substantive case in the Court of Appeal has now been concluded. Judgement was reserved and clearly we can do little but await the decision of the Court.

Whatever the decision is, it is going to have a profound impact on our operations.

Split of assets between Landcorp and DOC

From the time of the provisional allocation of assets between Landcorp and the Department of Conservation there has been very strong pressure from DOC for certain areas on blocks allocated to Landcorp to be set aside from the farming area for conservation purposes. There have also been claims that certain farming blocks should be transferred in total to them.

In the first round of discussions, after lengthy negotiations in the course of which DOC really got most of what they asked for, a settlement was reached between DOC and Landcorp.

However, the ink was hardly dry on this agreement before DOC and its constituents sought to have it reopened. Ultimately after further concessions to DOC, agreement was reached again and we believed finality existed when the assets were about to be transferred on April 1.

However, when agreement was not reached on price and when an injunction against transfers of land to State-owned enterprises was granted by the Court of Appeal, DOC's constituents (as they call them) saw this as an opportunity to seek to reopen the whole subject of the allocation of lands.

The Government took the stance that they would only recognise mistakes and that they were not prepared to go through the whole exercise again. Certainly mistakes have been made in the rush to conclude matters before April 1, but they are relatively few in number and nothing like the 380 claims against Landcorp and 180 against Forestry Corp being made today by DOC.

However, in response to further pressure, the Government has decided to establish a two stage process:-

- Resolution of drafting or other areas by July, 31.
- Resolution of disputed land by December 15, 1987.

This has been a very difficult matter for Landcorp as our contestants have taken an extremely high profile while we at the request of Government have been obliged to adopt a very low public profile while defending privately what we believe to be our entitlements as vigorously as we can.

Renewal of leases

We got some bad publicity recently over increased lease

rentals in Christchurch on the expiry of Renewable Leases. In some cases rentals were increased from as low as $30 per annum to something like $700 per annum. The fact these reviews were taking place after 35 years at the previous rental and that they were still geared to a very low percentage of valuation was ignored. A rental of $750 per annum on a section valued at $20,000, which was typical, meant a return for the lessor of no more than 3.75 percent of current valuation until the next review.

The media really did not distinguish itself in the way it handled this matter.

Conservation Act

Government has decided through provisions in the SOE and Conservation Acts that marginal strips along streams and rivers be excluded from all transfers of lands to State-owned enterprises. Ministers have decided that the beds of rivers and streams three metres or more in average width, should be excluded from transfers to State-owned enterprises.

Landcorp's interpretation of the marginal strip issue in the light of SOE and Conservation Act provisions is that:-

- Existing formal leases and licences (which may or may not contain freeholding rights) are <u>not</u> caught by the SOE Act provision.

- Crown land to be transferred to Landcorp which has been surveyed and has already had S.58 strip(s) laid off, or a decision made not to do so, will also <u>not</u> be caught by the SOE Act provision.

- Any other land to be transferred to Landcorp which is unsurveyed and has not had S.58 strip(s) laid off <u>will</u> be caught.

However, in an opinion dated 22 May 1987, the Crown Law Office has indicated that it does not agree with the

first point; rather it believes all Crown land on lease or licence must have strips excluded before transfer to Landcorp. If this view is accepted by Government, it could have serious implications for Landcorp's lessees and licensees. Ministers are considering the policy issues flowing from this legal opinion and hopefully corrective action will be taken.

These steps, however, are a major worry to Landcorp. Landcorp has indicated to Government its willingness to negotiate a reasoned and reasonable general transitional arrangement with DOC, to be followed later by negotiations on particular areas. The hope has been expressed that DOC and conservation/recreation interests would take a similar approach. However, experience with Land Settlement Board and Department of Lands and Survey over recent years suggests conservation interests may continue to make extreme demands for the prohibition of stock on all sorts of riverbank or berm situations, even in situations where severe practical farming problems would be caused and/or where there was no significant environmental damage being caused.

Further Landcorp has suggested to Government that the value of lands affected by the laying off of marginal strips will be seriously diminished.

The implications of Government's decision relating to lake and river beds are similar to the marginal strip issues. Landcorp has suggested that this decision also will have major implications to the value of assets expected to be transferred to it.

By way of example, because the Crown has had traditional use in respect of the water in the lakes and rivers at issue, very few formal water rights exist. Landcorp, and it would seem now its lessees and licensees, will be faced with formally applying for and going through the statutory processes (including objection phases where conservation interests would no doubt object in most cases) in order to obtain the many new water rights and easements that would be necessary. It is

anticipated that well over 100 new water rights would have to be sought by Landcorp alone. This would be a costly and time consuming process.

Land settlement

Naturally SOE Boards are not happy about this and consequently progress has been slow. To date agreements on price have only been agreed by N.Z. Post and Government Property Services.

There is no provision for arbitration and this is of concern to the Board.

The future

Farming: In the past, the farming operations under the Lands and Survey Department were managed with the divided objectives of preparing land for settlement, and the settlement of new farmers, plus the objective of endeavouring to farm for a profit. Despite this difficult management situation, the Department's farming operations were still a very good average when assessed on a national basis.

With the clear objective of farming for profit, I see no reason why the Corporation's farming operations cannot be managed to place Landcorp amongst the nation's top farmers.

Any constraints experienced by the Corporation as to how products are marketed beyond the farm gate have been removed. This will enable the Corporation to use its size and volumes of production to achieve better prices and reduce charges.

The Corporation will face the same constraints as those affecting New Zealand agriculture in general, the main one of these being the cost/price squeeze due to our agricultural exports being driven by our higher internal inflation rates.

The Corporation intends to retain and enhance the livestock breeding schemes and views these schemes as assets over and above the other livestock enterprises. Our livestock is well known and sought after.

Landcorp sees itself as being very much a part of the New Zealand agricultural industry and will aim to become a leader in this area.

Property: The leases, licences and mortgages taken over by the Property Division have various contractual rights which will constrain the Corporation in the commercial environment; their value will be taken account of when these assets pass to the Corporation. This matter is currently being negotiated with Treasury.

In this particular area, Landcorp has inherited a number of legal contingencies in the form of litigation. These claims revolve mainly around the interpretation of the Land Act 1948. It would be inappropriate for the Corporation to be making comment in view of the pending court decisions.

Due to the downturn in the agricultural sector, Landcorp is inheriting extensive problems in the area of leases, licences and mortgages. Landcorp is sensitive in this situation and the Board has formed a liaison committee to interface with farmer representatives to address these problems.

We intend to be active in property management, in both the urban and rural sector and in the development and sale of urban property.

Pastoral leases

After considerable deliberation, Cabinet agreed that pastoral leases will remain Crown land and not pass to the Corporation. In making this decision, Cabinet agreed that Landcorp would be the agent of the Crown and act on behalf of the lessor and manage the lessor's interests. Landcorp has a responsibility in addressing both farming

and environmental matters in line with Land Settlement Board policies. Landcorp accepts DOC's role as an advocate for conservation and that it will be involved in those aspects of pastoral lease management.

To this end Landcorp and DOC have formulated procedures for implementing Cabinet's direction.

Conclusion

We see it as our role to be good farmers and good landlords who are strongly motivated to pass on the land assets to our successors in better condition than we obtained them. We will want to improve the profitability of the Corporation by improving the productivity of the properties and, therefore, we will be very responsive to requests from lessees to assist them to take advantage of potential which they see in their properties. It is in our interests that lessees should be doing well as it is really only in that way that we also can obtain improved returns.

We would hope that we will be able to sell some of our properties and buy others to make better economic sense of what we own at the moment. We will certainly be seeking to develop high quality breeding stock by taking advantage of the scale of our own operations and this will be true, not only for cattle, but also for sheep, deer and goats.

We may well enter into partnership agreements with others wherever there appear to be mutual benefits in doing so. If we have land and someone else has expertise, that seems a good basis for a joint venture; similarly if we have access to money and expertise and someone else has the land, that also seems to offer opportunities for joint venturing.

In summary, I would like to emphasise the Landcorp Board intends:

- to manage Landcorp as an efficient and profitable State-owned enterprise;

- to be a good employer;

- to act in a professional and creditable way in all its dealings;

- to act with sensitivity in areas of social and community interest.

Problems and prospects

Mr Hamish Ensor*

Recently the Christchurch Press reported that the Under-Secretary for the Environment said that one of the greatest achievements of all government restructuring was the division between protection and production. I don't want to believe this was said and I hope it was reporter's license that made this assumption, but it worries me that this will become the public's perception of what is happening. For the pastoral lessee and for the nation it will be a sad day when we divide conservation and production across the whole spectrum of New Zealand land.

In 1948 (which in terms for land is only yesterday) the pastoral lease was created as the line that could be drawn between that which could be alienated and that which probably never should be. This was plainly a recognition of the fact that, within that line, production and protection should go hand in hand to the benefit of the nation. The Royal New Zealand Forest and Bird Protection Society, as stated in their annual report, see this land as "predominantly conservation land." With this I would agree, if it includes conserving the production of the land which is very important to New Zealand's overseas earning capacity. However, I suspect it does not and thus the public perception will be that there needs to be a continuing carve up of the nation's land one way or the other which is a real tragedy for a country with land having many values. Having said that I see no reason to preclude divisions where it is practical and all parties are happy on specific situations such as the freeholding of

* High Country Committee of Federated Farmers

individual pastoral leases. But any across-the-board legislation that forces this upon people is bound to have repercussions especially on the land and its various values.

Landcorp

Now that Crown Renewable Leases and Pastoral Leases are in completely different baskets they must be dealt with separately. As a high country farmer representative I will deal only with pastoral leases. However I suggest that hill and high country farmers who have renewable leases should join the recently formed association as it would be in their own interests to have a united body to represent them. Theoretically pastoral lessees need not have any fear of Landcorp. The Corporation will simply have a contract to administer pastoral leases on behalf of the Crown's Land Department under the same law, conditions, and policy that have always applied. They have no axe to grind and we should welcome the fact that they are now a commercial entity which means that we can jointly get on with the job and decisions can be made swiftly as is usually the case under any business relationship. Pastoral lessees would do well to realize that they have every incentive to help Landcorp to carry out their contract efficiently but unlike most other sectors involving lessees there is no switching to the opposition as there is no other company doing the same job. Conversely the High Country Committee will be very distraught if Landcorp take advantage of this monopoly and I hope that the liaison committee that has been established forestalls any problems.

Department of Conservation

From the pastoral lessees point of view DOC is the unknown player in the land administration game, mainly because it is new and its procedures and performance have not yet been tested. It is charged with the responsibility of completing the Protected Natural Areas programme and this is where they have a problem and pastoral lessees, a real headache. Once the PNA programme became a fait accompli the HCC went along

with the programme provided that it was done efficiently and within a short specified timeframe and on a South Island basis. We were given the assurance that this was the objective and apart from initial hiccups it got off to a good start. But since then it has almost ground to a halt with the completion date nowhere in sight. We are on the verge of being forced to remove the last of our support to this scheme because of the impossible position it is placing lessees in, with some even having moratoria placed on activities which have been normal farming practices for years. We are told time and time again that funding is the problem. This is rubbish -- PNA is a one-off programme cost and if this country has a real commitment to it the job would have been done by now. The procrastination is disgusting and if DOC, as advocates for conservation, has any backbone it will front the government for funding and if it is not available drop the scheme and return to the old system.

Let's face it, the old system of judgement by the Crown's agent must have worked and still can, otherwise those special conservation values wouldn't even be there. Landcorp is charged with the job of administration and has, as I said earlier, no axe to grind in favour of any particular value or against it. With DOC available for advice, and required to give it by government, why not let Landcorp get on with the job as before?

One last thought on PNAs. The High Country Committee does not accept that final designation decisions can be made on a regional or survey district basis because the political and financial realities are that when a monetary input is required priorities will have to be considered along with all other taxpayer requirement and aspirations and not solely on what conservationists may believe in.

In this respect I fear for conservation in N.Z. because now its costs are clearly identified and can be weighed against the nation's other requirements.

Another major problem for DOC in the high country is going to be its ability to control weeds and pests on

large areas of land especially on river beds which many interest groups believe DOC should have and control at the taxpayer's expense. By its own admission DOC is short on agricultural expertise and understanding and it could well consider the employment of such expertise to help them with their deliberations. A good example is the issuing of burning permits. It would be of immense help to DOC if they understood why farmers needed to burn a particular block of land before they made their recommendation to Landcorp. As an aside, the apparent restrictions and change of attitude to the issuing of burning permits is a sore point with high country farmers.

Prospects

These are hard to determine before any of the present administrations or systems have got their feet firmly on the ground. However the most important thing for a balanced future for the high country is the continued existence of the Lands Department even if its work requirement is reduced to a mere handful of personnel. Its most important function will be to review and write up the policy and legislative requirements of land such as pastoral leases as well as the other functions already identified for it.

One prospect for high country administration that is extremely daunting to all involved is the question of marginal strips. Section 58 of the Land Act dealing with this matter has been given as one of the delays on pastoral lease administration for some time, but throw Section 64(4) of the Conservation Act and Section 24 (2b) of the S.O.E. Bill into the ring and chaos should continue for some time. When I ponder the reasons for marginal strips two main possibilities emerge. Firstly, the protection of river banks and water quality and secondly, the assurance of public access and enjoyment of our rivers. If the protection aspects can be cared for regardless of tenure, and that it the opinion of most officials, the real reason for marginal strips is access. To actually implement this system of reservation on specific pieces of land would be an incredibly expensive

exercise in futility and it is typical of trying to administer land in the high country by across-the-board law or policies to cover all aspects. The recent policy for destocking and surrender runs the risk of falling into the same trap. Surely if one looks at the rights of the land occupier and the public in any specific case and applied a little practical brain power a solution should be attainable at a reasonable cost regardless of who ends up owning the title to the land. If all else fails there is always Section 117 which is the compulsory acquisition of land for a proven public purpose. All I can say is "there must be a better way."

While the new land administrative system has rationalized the demarcation of responsibilities on unoccupied areas of high country land the prospect is that the patchwork effect will now be shifted to within the areas encompassed by pastoral leases which will inevitably bring the runholder and the public into closer conflict which is so sad. Once again there must be a better way.

In conclusion there are two future prospects I would like to leave with you. Firstly any forced reduction in the security of tenure over any grazed area of land will not be in the best interests of anyone or of the land itself. History has proved this and also proved the success of pastoral leases which are only thirty-nine years old. Secondly, while decisions are delayed, the nation continues to ignore the greatest high country problem of all, the rabbit, who waits for none and continues its devastation. As an introduced species the rabbit is totally incompatible with our environment and as such must be dealt with in the most cost effective way now or none of the other issues will really matter anyway.

Mr David Henson*

Our Coalition welcomed Government's decision to retain Crown tenure for pastoral leasehold land.

However, the issues and conflicts have not changed. Will the new system address them any better than the old? It is too early to tell but I can discuss stumbling blocks. I will go through the various components of the new machinery.

Department of Conservation

DOC's responsibility for pastoral lands occurs at two levels.

They have a reactive role. They have to advise Landcorp on environmental implications of day-by-day management. Liaison between the two bodies has already been established for this work.

Secondly, and more importantly, they have to take the initiative on environmental issues such as land surrender, the PNA programme, fostering recreation (both amateur and commercial), and facilitating access.

The programme and resources for this work have not yet been put together. It is rumoured that one of DOCs regional offices did not include the PNA programme in its initial budget. Another handicap is that the functions listed are split between separate DOC divisions.

To be fair, DOC is now addressing this issue and we wish them well. They had to start from scratch and will take time.

Landcorp

The Corporation's role may be seen as clear cut. It is in fact ambivalent.

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It is required to act commercially in managing Crown farms and administering Crown leases.

It has also delegated authority under the Land Act. Thus it has a regulatory function.

There is inherent conflict between these roles. I know of two substantial breaches of Section 108 since April, this year. In one case Landcorp looked the other way for several weeks. The other took less time but Corporation staff subsequently sought to justify the breach.

I conclude that the Land Act will continue to be honoured as much in the breach as in the observance.

Underlying this is the fundamental question of whether 20 percent of New Zealand's land can be corporatised successfully. What may work for coal mines or communications may not work for vast lands with a multiplicity of uses and values. We will not know the answer to this riddle for some time.

The Department of Lands

A nearly forgotten part of the present machinery is the residual Department of Lands. This was kept in being as an undertaker.

However, there is a growing view, which we share, that a permanent and neutral Government Department is needed as a repository for the Crown title and legislation concerning Crown-owned land.

However, there is a gap in the system. This gap has been created by the demise of the Land Settlement Board.

Land use questions are complex and occur frequently. By their very nature they cannot be resolved by ministerial decisions. While quangocide is in fashion there is an irrefutable case for land use quangos. The decisions to retain Board policies is hollow without a body to interpret

and apply them. A new body is needed which should be more representative than the old Board and with a more specific task - the pastoral high country and perhaps other lands that may remain with the present Department of Lands.

We strongly believe that a new body should be established for this particular purpose. Policy making should not be tacked on to any existing body with other functions.

Landcorp management agreement

The relationship between Landcorp and the Crown, including DOC, is governed by a management agreement. There have been several drafts and I want to comment on some aspects of the latest version. It is not always consistent with the Government's decision on pastoral lands.

Cabinet decided that Landcorp would manage pastoral leases and licences. The agreement adds grazing and recreation permits, hence some of the arguments over land allocation. Grazing permits are by definition, over Unoccupied Crown Land (UCL) and therefore not part of the pastoral lease system. Recreation permits also cover large areas of UCL.

Originally the Corporation was to consult DOC and have regard to its advice on conservation matters. The phrase "have regard to its advice" has been dropped. The implication is obvious.

Landcorp will act as Crown agent for managing pastoral leases. The manner in which it is paid for this service is important. Clearly it should receive an adequate fee. However, it proposes to keep the rentals as well. This will be a further alienation of the Crown's interest in the land. There will be a conflict between the Corporation's financial interest and its duty as Crown agent. There are implications for both runholder and greenies in this.

Those are some pitfalls in the new administration. I sincerely hope that they can be overcome.

I take issue with some of Peter Egan's statements and offer the following comments.

Land allocation

Our Coalition had to fight hard to obtain public input. It has been suggested we waited till the ink was just dry on the agreement. In fact this was our first opportunity. When the maps and schedules were released we found a shambles. There were some genuine errors and misunderstandings.

However, the Government decision was that the Corporations were only to receive lands used principally for production forestry or commercial farming. Forestry Corporation mainly adhered to these criteria. Consequently most of its problems are questions of access rather than actual allocation. Landcorp greatly exceeded this brief hence their problems. I do not have time to give examples but we have documented the matter in great detail.

Marginal Strips

It is suggested that the exclusion of riparian strips of land transferred to the Corporation will greatly disadvantage Landcorp and its tenants. In fact, these strips are a traditional tenure device throughout New Zealand. They exist widely and balance public access rights with the interests of the adjacent farmer.

There has been conflict about stocking pressure, particularly by cattle, on lakes and wetlands. However, to link this situation with the marginal strips question is misleading. These strips are comparable to paper roads. They are not a legal and physical barrier and may be used by the farmer and his stock on equal terms with the public.

Professor Kevin O'Connor*

The time left in this discussion is short. I will be brief. The time left for government and people of New Zealand to clarify intentions on the treatment of nature in mountain lands is similarly short. For this reason we should make haste together.

For ten years or more I have pointed to the urgent need for a comprehensive mountain policy that would take account of continuing changes in mountain lands themselves and in our understanding and knowledge of them. As well, it would be open to take account of continuing changes in what different people seek from our mountain lands. It is this condition of continuing change which makes it imperative for us to recognise that, to be comprehensive, a policy should not be tight, fixed and closed.

I believe that we had the beginnings of a High Mountains Policy with the 1979 government adoption as guidelines of the policy, goals and objectives for the different use sectors, farming, forestry, nature conservation, water use, recreation, tourism and the like which emerged from the 1977 High Mountains Conference. Some governmental agencies and non-governmental organisations continued to pursue their own agenda. Others, like Land Settlement Board, adopted the principles of policy as stated, but continued to battle with issues of detail as before. Like the Hebrews of old, neither governmental organisations nor any other body behaved much differently because some Moses had just published on some mountain or other, some new comprehensive policy!

From 1979 to 1984 and beyond, we seem to have accelerated and diversified change to our use of mountain lands while our ability to engage in open, rational land allocation has decayed. Pastoral farming continued to

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intensify on runs steadfastly classified as land unsuited to farming of any kind. Administrative constraints on forestry were maintained while pines continued to spread into unimproved tussock grasslands. Surveys for prospective nature protection were vicariously promoted while the opportunities for effective, representative nature conservation in the lowland and montane zones were rapidly reduced by pastoral development.

It is literally in housekeeping that ecology and economics are tied together. It is as well to remember that we were not managing the housekeeping very well by 1984 when we called in a new housekeeping firm, new brooms, new acts, new corps and all. From the discussion so far, one might guess that many of us seem determined to use the new instruments of policy as some of us used the old, for the division of mountain landscapes into sectors of bureaucratic power. Let us try some other approach, lest our mountains come to resemble the sectarianised neighbourhoods of Belfast or Beirut.

The division of functions according to purpose of use which is at the heart of the new resource management legislation is primarily a division of governmental function, rather than a partition of land. In O'Connor and Swaffield (1987), the rationale in public administration for that division of functions is acknowledged. At the same time we recognise that conservation purposes and development purposes often need to be fitted together in the one landscape. Such landscape integration is a community action that requires that central government organisations should spell out the national goals and guidelines and let local communities act freely to fulfil them.

Why not allow local people to act without the constraints of planning law or any statutory pressures? Why not leave the whole of land use to market forces? Clearly the market fails when there is no voice bidding for nature or for posterity. Likewise local process fails when there is no voice for wider, national interest, or when local interests are dominated by past patterns. In the

past we have allocated land with an often unspoken hierarchy of prejudice. The "best-sited" land was used for urban settlement. We have shouldered the cost of later difficulties in flood protection or communication, rather than face the prospect of urban relocation. "First-class" land has been used for any kind of farming, regardless of its significance for food production. "Third-class" land has been proffered for forestry. Open country, seen as "unsuited for farming of any kind", we have leased for pastoral purposes. Mountain forests and wilderness of little potential value for production we have dedicated as national parks and the like. Often in so doing we have been in conflict or confusion as to whether we were saving them for scenery or for science, as pleasuring grounds for tourists or out of respect for some of our ancestors.

Each such past decision could have been made differently. Often a different decision would have been wiser. Being wiser later suggests that we not make all decisions in the one direction, that we look to opportunities to defer choice, to keep options open, that we avoid irreversible pathways except after careful exploration, and that we leave some observable markers of the way that we have come.

This is the social and ecological context in which we should consider our land use history. The good of environment and our future human good demands that land be used within its technical limits, which vary from use to use and from one kind of land to another. This requires us to assess land in terms of its inherent characteristics, whether climate, rocks, landforms, soils or vegetation, analyse our land use experience and assess each kind of land in terms of its suitability for each use.

The good of society demands also that land be used in relation to the varied needs of society. Past neglect of the needs of society for land preserved as nature, especially where it could be used for something else, has led to surveys for representative, "observable markers of the way that we have come". Past frustration with real

or imagined difficulties of access to lands suitable for recreation has led to common cause between recreationist and preservationist. Past commitment to an antiquated pastoral lease tenure by both government and pastoral farmer has made lessees especially apprehensive about current change, even though they have been generally supportive of nature conservation and facilitative of recreational access and use.

I lament the failure of the Department of Lands and Survey and of the Land Settlement Board and the continuing reluctance of their successors to deal with the recommendations which emerged from the Protected Natural Area Programme surveys, especially that of the Mackenzie Ecological Region. An open and courageous attempt to deal with those scientific assessments would have called for similar scientific assessments of suitability of land for pastoral farming, recreational use, forestry and the like. For the Crown as lessor would have been put into a negotiating stance with its own lessees. Such a negotiation would have to take account of the public interests in the land leased as well as the lessees' interests. Just as the Clayton Committee foreshadowed, if future use of such land under new tenure is to be within the limitations of the land and in keeping with the range of interests, private and public, in such land, then the land needs more careful interpretation and assessment for a wider range of interests than it has had. Extensive pastoral use and nature conservation may be mutually compatible on the same ground in some circumstances. Intensive pastoral farming and nature conservation may need one another but they need to be separated. Whether recreation fits with either depends on the land and the recreation. Such issues cannot be resolved anywhere but on the land itself, among people of different interests but sharing a common language assessment of individual and social needs at local and wider levels for the functions, outputs and benefits of different land uses, including keeping it as it used to be.

Maximising fine wool income — Principles

Dr David Cottle*

Introduction

Wool producers considering management options need to balance the benefits against costs. Options developed by scientists may realise extra returns but their adoption by farmers will depend on attitudes towards the risk of spending more to earn more. With high interest rates, the cost/benefit of an option needs to be clear cut. Few runholders record the amount of wool produced per class (and breed) of sheep, so often decisions about stock management are made without good objective data (Kerr and Lefever, 1983).

Hill and high country farmers in the South Island receive 40-50 percent and 60-70 percent respectively of their gross income from wool (Kerr and Lefever, 1983). The most numerous sheep breeds are Merinos (44-50 percent) and Halfbreds (33-44 percent).

The wool production of a flock depends mainly on its genetic worth or estimated breeding value (EBV), the feed it consumes and its health status. The income derived from this wool depends on the quantity and quality of the wool produced, its preparation and marketing.

The genetic worth of a breeding flock is determined equally by the EBV of rams and ewes used. In a flock breeding its own rams (e.g. studs) the genetic improvement in the flock is heavily influenced by ram quality, as about 80 percent of the total selection

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pressure (differential) is achieved from ram selection. Similarly in a commercial flock, genetic improvement is largely influenced by the choice of sire source, rather than flock ewe selection. This paper deals with ram management and breeding and selection policies, because they are critical to genetic progress.

Most wool returns are obtained from ewes and/or wethers. Stock nutrition determines how much of their genetic potential for wool returns will be achieved. Thus pasture development, grazing management and feed planning for different classes of stock are also discussed. Flock health management and wool preparation are only briefly discussed.

Ram management

Rams should have high quality semen, a high semen output and a high serving capacity. The relationship between semen test results and subsequent ram fertility is very poor, whereas there is a high correlation between ram activity in the paddock and the percentage of ewes becoming pregnant. Therefore a ram should be in good working order, with a healthy libido and should be assessed at least six weeks prior to mating, so a replacement can be obtained if necessary.

Each ram should pass the 4T's test.

Tossle - no ulcers on the penis or sheath, freely moving penis, no swellings.

Testes - firm, equal, good size, no lumps, well off ground, no skin lesions, no brucellosis.

Teeth - unbroken, not overshot, not undershot.

Toes - trimmed, even feet, no foot abscess or footrot, free joint movement, no joint swelling.

Principle 1. It is financially advantageous to run fewer, sounder, superior (more expensive) rams.

This assumes inbreeding is not a problem i.e. large flocks are being considered. Each gram of testicular tissue produces about 20 million sperm per day, and Australian work suggests that provided 400g of testis is allocated per 100 ewes, the sperm-producing capacity of the rams is adequate to achieve normal fertility (Gherardi et al. 1980). As individual rams have paired testes weights of 100-800g, rams are generally able to cover ewes adequately at mating percentages around one percent under Australian pastoral conditions. Testicular tissue is highly sensitive to fluctuations in nutrition - changes in testicle size always precede live weight change. In the Mediterranean climate of Western Australia rams fed daily with 500g lupin seed for two months prior to mating often have testes twice the size of control rams. The reduction in rams needed per 100 ewes has made the lupin feeding a more profitable method of providing the minimum amount of testicular tissue, than buying additional rams.

Mating percentages in the hill and high country are usually 3.5 - 5.5 percent. Mating percentages required in New Zealand high country farms are probably higher than in Western Australia as there are more obstacles to ram/ewe contact. In Australia if it is rainy and windy, mating activity slows down. This seems to depend on the previous experience of sheep, as the effect is more pronounced in young sheep which may never have experienced rain before. My brief experience in New Zealand suggests there wouldn't be many sheep in this category! However in the drier high country areas, if feed is poor during mating and sheep are spread out over a wide area, it may pay to round sheep up to facilitate contact. Other obstacles to ram/ewe contact in New Zealand high country would be large paddock sizes, the topography, vegetation (scrub etc) and possibly poor feed. These factors can all cause flock dispersion and can be combated, if they are real problems, by appropriate action, e.g. increased subdivision or keeping mob sizes down to 500.

Weaned ram lambs tend to run in a monosexual environment which may stimulate abnormal behaviour in young rams. Up to 30 percent of young rams are non-workers due to lack of experience or abnormal sexual experience (Fowler, 1976). This problem can be reduced by running cull ewes with young rams either on the stud or the commercial property. Young rams can be mated in a ratio of two older rams : one young ram to older ewes, so the older rams compete with each other leaving the younger subordinate ram free to mate and gain experience.

Rams can be used as soon as they are big enough to efficiently serve ewes and on a well-managed property this should be as two-tooths, not four-tooths. It is better to purchase a few young rams each year rather than purchase a larger quantity at less frequent intervals. The choice of how long to use purchased rams is a compromise between maximising rate of genetic gain and getting value (i.e. progeny) out of the purchased ram. From both a genetic (James 1979) and fertility viewpoint rams should not be kept past five years of age.

Examination of rams for the 4T's should take place when rams are shorn three to four months before mating, just prior to mating and three months after mating.

If rams are harnessed, the harness should be fitted at the inspection prior to joining so the harness can settle in and be adjusted. Harnesses not only facilitate lambing management, but inspection of raddle wear enables detection of non-active rams.

Shearing, crutching and dipping of rams should not occur within six weeks of mating as sperm production takes six weeks to recover from temporary infertility caused by heat or stress.

Manual inspection of the rams will ensure they have the equipment, but not necessarily the desire or libido. Libido can be tested in the pen, but serving capacity tests are of questionable value in practice, given the

difficulty of conducting them, the high proportion of rams that don't serve and the low heritability of the trait (Purvis et al. 1984). More worthwhile gains may be made by measuring testes size which is genetically correlated with lambing percentage (0.26) and highly heritable (0.69) (Purvis, 1987). Serving capacity tests on New South Wales studs were promoted by Phil Holmes, a private consultant, with some major clients e.g. Bonooke. Holmes claimed that 20 percent of 5000 rams surveyed running on properties in New South Wales were not getting ewes pregnant, 60 percent due to physical problems and 40 percent due to libido problems (Holmes, 1983). A rapid improvement in lambing percentage occurs in a flock using libido tested rams. However, as 50 percent of 2-tooths don't display libido, selection pressure on wool traits would be drastically reduced with rams of this age.

Finally, rams should not be left in an inaccessible paddock and ignored until shearing or the next mating. They should be kept near the home or in a paddock which is frequently passed. Problems will then be picked up earlier.

Breeding and selection

One of the most important questions a flock owner must ask is - what is my breeding objective? The objective may be to maximise the net returns/ha from the flock. This objective must then be translated into selection criteria or traits in individual sheep (usually lambs or hoggets).

The relative emphasis placed on $trait_i$ should be related to $a_i \times h_i^2 \times \delta p$, where a_i = relative economic value (REV), h_i^2 = heritability and δp = standard deviation of the trait (a measure of variability). The higher the financial value, heritability and variability of a trait, the larger the predicted response to selection and hence future returns to the grower, if sheep are selected on their observed or phenotypic values for that trait.

If several traits are important, information on all these traits must be combined somehow to make selection decisions. Alternative approaches to combining these traits are to use tandem selection, independent culling levels, selection indices or combinations of these, or visual classing, an intuitive, subjective version of the above methods.

Index selection results in the highest rate of predicted financial gain in all situations. The superiority of index selection is greatest when there are a large number of selection traits and they have similar importance. Index selection however has the highest cost, because all the traits have to be measured or assessed and the data processed. As the response of each individual trait to index selection can be predicted, it does not result in an "aimless" increase in financial returns as suggested by Jopp, (1982).

The theoretical benefit/cost of various selection methods can be predicted by calculating the change in wool production resulting from genetic progress and associated testing costs.

When Merino sheep are considered, the high returns from wool (70 percent of income in a ewe flock, 92 percent of income with wethers, Saunders, 1983) dictate that wool traits be given major emphasis. As most Merino flocks do not keep records of birth/rearing status, the main traits used in an index are body weight, fleece weight and fibre diameter. Subjective traits such as body conformation, wool colour, handle and staple conformation (Jopp, 1982) have low, difficult-to-define REVs. If considered, they would have independent cull levels and would have minor impact on selection decisions, and would lower the predicted responses of the main traits. If a sheep with poor conformation manages to produce a fleece worth a lot of money, should it be culled?

Should body weight be considered in a selection index? New Zealand breeders (e.g. Jopp, 1982) appear to place emphasis on body size, as do Australian ram buyers

(Dunlop and Wilson, 1987). There is a belief that big sheep are better than small sheep. When selecting hoggets this feeling is hard to overcome. However, if the higher feed intake of bigger sheep is considered in relation to finite feed supplies and the REV of liveweight is calculated for surplus sheep sales, the percentage reduction in total returns resulting from omitting hogget liveweight from a selection index is only 0.1-5.4 percent, depending on the flock structure (Ponzoni, 1986). Increasing liveweight by selection is more beneficial the higher the stocking rate and the higher the proportion of ewes in the flock (Buchanan and Lewer, 1986).

This section compares the benefit/cost of index selection, combining fleece weight and fibre diameter only, with single trait selection and random selection, (i.e. no change or response to selection and no selection 'costs').

The REV values used in this study were derived from an analysis of New Zealand wool auction prices from 1983/7

(Price = 611 + 795648$e^{-0.4}$ x FD, Wiggins pers. comm.). The net returns (gross minus NZWB levy, handling charges etc.) of increases in production were calculated to be 83 percent for wool weight and 90 percent for micron changes. The cost of shearing was regarded as a fixed cost. The costs of testing were based on Lincoln College Wool Measurement Service charges and the estimated cost of fleece weighing and/or sheep classing. These costs were \$4.75 + \$0.30/CFW, FD test; \$3.50 + \$0.30/FD test; \$3.75 + \$0.30/CFW test; \$0.30/GFW and \$0.15/visual class.

Two different flocks were studied, (1) a self-replacing stud flock of 1,000 breeding ewes, weaning percentage of 80 percent, keeping 60 percent of its ewe hoggets and four percent of its ram hoggets. No extra value was assigned to surplus ewe hoggets and cull rams and 56 percent of ram hoggets were sold, a common industry figure. In practice commercial ewes may be selected at weaning rather than as hoggets (Jopp, 1982). This would have the effect of reducing h^2 and the calculated

genetic responses. This would also occur if FD was measured in woolly hoggets. (2) a commercial flock with the same age structure as the stud flock, purchasing rams with the average EBV of sale rams from a stud using index selection. The results obtained could be extrapolated to closed flocks of different sizes.

The genetic parameters assumed were h^2FD = 0.5, h^2CFW = 0.4, Genetic correlation (r_G) = 0.16, Phenotypic correlation, (r_p) = 0.14, $s_{p,FD}$ = 0.4 - 0.5 and $s_{p,CFW}$ = 1.4 - 2.0. These values have been corrected for sex, maternal handicap etc. If this is not done in the field, then responses will be lower.

These values were assumed to stay constant, although in practice changes in gene frequencies in the population would cause h^2 and r_G to change and reduce the response to selection. The annual rate of improvement in Trangie CFW selection flocks has remained constant at one percent/year for 25 years (McGuirk, 1982). This is a similar figure to that predicted here for CFW selection flocks (see Table 1), which suggests the predicted responses can be obtained in practice.

Three Merino strains were simulated for 20 years with the starting values shown in Table 1. The flow of genetic improvement was calculated by giving selected hoggets a lifetime EBV (and phenotype) = average of parent's EBV + $i_{(E or R)} x s_p x h^2$, where i_E = 0.665 and i_R = 2.16 Thus the response shown in Table 1. was equal to $(i_E + i_R)/2 x h^2 x s_p$

Table 1. Response to selection, in a self replacing flock assuming all hoggets are measured. 60% of ewes and 4% of rams are kept

Sheep Type	Selection Method	Average Fleece Traits after 1 generation of selection in both sexes FD	CFW	$	Increase in Average Fleece Value/generation ($)
19μm FD	1.1 Optimum Index	18.02	3.035	30.78	5.54
3.0kg CFW	(1.3 CFW-FD)				
$25.24/fleece	FD constant index (26.3 CFW-FD)	19.00	3.216	27.07	1.83
	GFW Index (GFW-1.6 FD)	18.00	3.001	30.53	5.29
	1.2 FD only	17.97	2.960	30.28	5.04
	1.3 CFW only	19.15	3.222	26.28	1.04
	1.4 GFW only	19.18	3.204	25.94	0.70
	1.5 Visual GFW	19.06	3.061	24.45	0.21
21μm FD	2.1 Optimum Index	20.02	3.586	26.41	3.35
3.5kg CFW	(1.9 CFW-FD)				
$23.06/fleece	FD constant index (25.7 CFW-FD)	21.00	3.750	24.71	1.65
	GFW Index (1.4 GFW-FD)	20.07	3.544	25.96	2.90
	2.2 FD only	19.86	3.454	25.86	2.80
	2.3 CFW only	21.16	3.756	24.27	1.21
	2.4 GFW only	21.20	3.727	23.96	0.90
	2.5 Visual GFW	21.06	3.568	23.33	0.27
23μm FD	3.1 Optimum Index	21.96	4.146	25.44	2.38
4.0kg CFW	(3.2 CFW-FD)				
$23.06/fleece	FD constant index (28.1 CFW-FD)	23.00	4.274	24.62	1.56
	GFW Index (2.3 GFW-FD)	22.32	4.084	24.52	1.45
	3.2 FD only	21.59	3.948	24.74	1.68
	3.3 CFW only	23.20	4.290	24.40	1.34
	3.4 GFW only	23.25	4.250	24.10	1.04
	3.5 Visual GFW	23.08	4.075	23.37	0.31

For each strain and selection method the cumulative increase in wool returns compared to a random flock was calculated as (average EBV of ewes, rams, or sale rams in the flock -starting value) x number of ewes, rams or sale rams. In the case of sale (surplus) rams in the stud the extra EBV (individual wool value) when multiplied by 50 estimates the increased value of these rams to commercial buyers in terms of increased production from all future progeny of the ram (Cottle, 1986). A comparison of all property auction ram sale prices from 1977-85 in New South Wales (Casey, 1987) with calculated EBV x 50 values suggests sale prices were closely related (assuming constant stud averages). The test cost was calculated as the single test cost x (400 rams + 400 ewes).

Table 2. Accumulated extra returns and costs in a stud after selection, compared to a random breeding flock

a) 20 years of selection

Sheep Type	Selection Method		Extra Returns (x$1000) Breeding Ewes	Rams	Sale Rams xEBV	Sale Rams +Sales	Extra test Costs (x$1000)	Benefit-Cost (x$1000) xEBV	Benefit-Cost (x$1000) +Sales
Fine Wool	1.1	Index	246.1 *(164)	11.6 (10)	67.9(44)	3,178 (2061)	80.8(40.4)	245 (178)	3355(2195)
	1.2	FD	222.7	10.5	61.4	2,877	60.8	234	3049
	1.3	CFW	46.0	2.2	12.7	594	64.8	-4	577
	1.4	GFW	30.9	1.5	8.5	400	4.8	36	428
	1.5	Visual	9.3	0.4	2.6	120	2.4	10	127
Medium Wool	2.1	Index	148.3 (97)	7.0 (6)	40.9(25)	1,916 (1171)	80.8(40.4)	115 (88)	1991(1234)
	2.2	FD	124.0	5.8	34.2	1,601	60.8	103	1670
	2.3	CFW	53.4	2.5	14.7	689	64.8	6	680
	2.4	GFW	39.6	1.9	10.9	512	4.8	48	549
	2.5	Visual	12.0	0.6	3.3	155	2.4	14	165
Strong Wool	3.1	Index	105.2 (69)	4.9 (4)	29.0(20)	1,359 (937)	80.8(40.4)	58 (53)	1388 (970)
	3.2	FD	74.2	3.5	20.5	959	60.8	37	976
	3.3	CFW	59.2	2.8	16.3	765	64.8	14	762
	3.4	GFW	46.0	2.2	12.7	594	4.8	56	637
	3.5	Visual	13.8	0.6	3.8	178	2.4	16	190

x EBV = current individual wool value
+ Sales = value of all future progeny
* (Ram only selection)

Table 2 cont.

b) 10 years of selection

Sheep Type	Selection Method	(x$1000) Breeding Ewes	Rams	Sale Rams EBV	Sale Rams Sales	Extra test Costs (x$1000)	Benefit-Cost (x$1000) EBV	Benefit-Cost (x$1000) Sales
Fine Wool	1.1 Index	40.8 (20.0)	3.0 (2)	14.3(5)	670 (234)	40.4(20.2)	18 (7)	673 (236)
	1.2 FD	37.0	2.7	12.9	605	30.4	22	614
	1.3 CFW	7.6	0.6	2.7	125	32.4	-22	101
	1.4 GFW	5.1	0.4	1.8	84	2.4	5	87
	1.5 Visual	1.5	0.1	0.5	25	1.2	1	25
Medium Wool	2.1 Index	24.6 (11)	1.8 (1.6)	8.6 (4)	403 (187)	40.4(20.2)	-5(-3.6)	389 (180)
	2.2 FD	20.6	1.5	7.2	337	30.4	-1	329
	2.3 CFW	8.9	0.7	3.1	145	32.4	-20	122
	2.4 GFW	6.6	0.5	2.3	108	2.4	7	113
	2.5 Visual	2.0	0.1	0.7	33	1.2	2	34
Strong Wool	3.1 Index	17.5 (5)	1.3 (1)	6.1(2.0)	286 (117)	40.4(20.2)	-16(-12)	264 (103)
	3.2 FD	12.3	0.9	4.3	202	30.4	-13	185
	3.3 CFW	9.8	0.7	3.4	161	32.4	-19	139
	3.4 GFW	9.6	0.6	2.7	125	2.4	9	131
	3.5 Visual	2.3	0.2	0.8	38	1.2	2	39

In the case of index selection, the benefit/cost of selecting only rams in the stud was studied, as well as ewe selection in the commercial flock. When ewes were unselected they were given the average EBV of their parents.

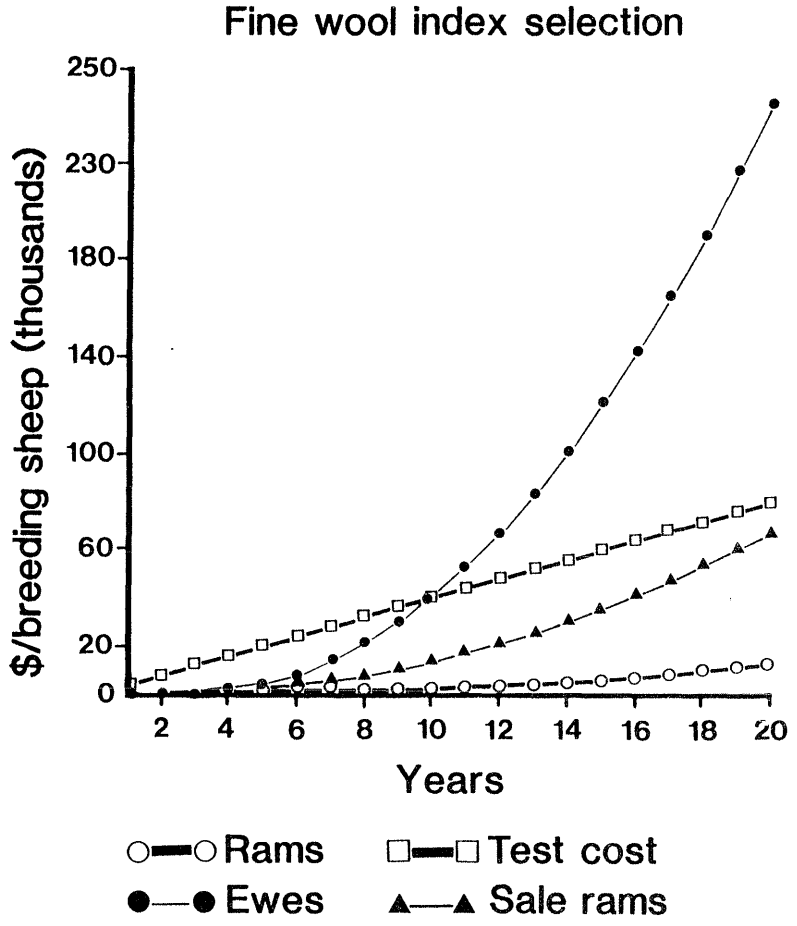

Figure 1. Fine wool. Cumulative costs and returns using Index Selection in a 1000 ewe study flock. Both rams and ewes measured, sale rams - individual value only (see text)

The results (see Figures 1-3 and summary in Table 2) suggest a number of conclusions:

Principle 2: The predicted additional returns from using objective measurement in a stud are well in excess of the additional costs of measurement.

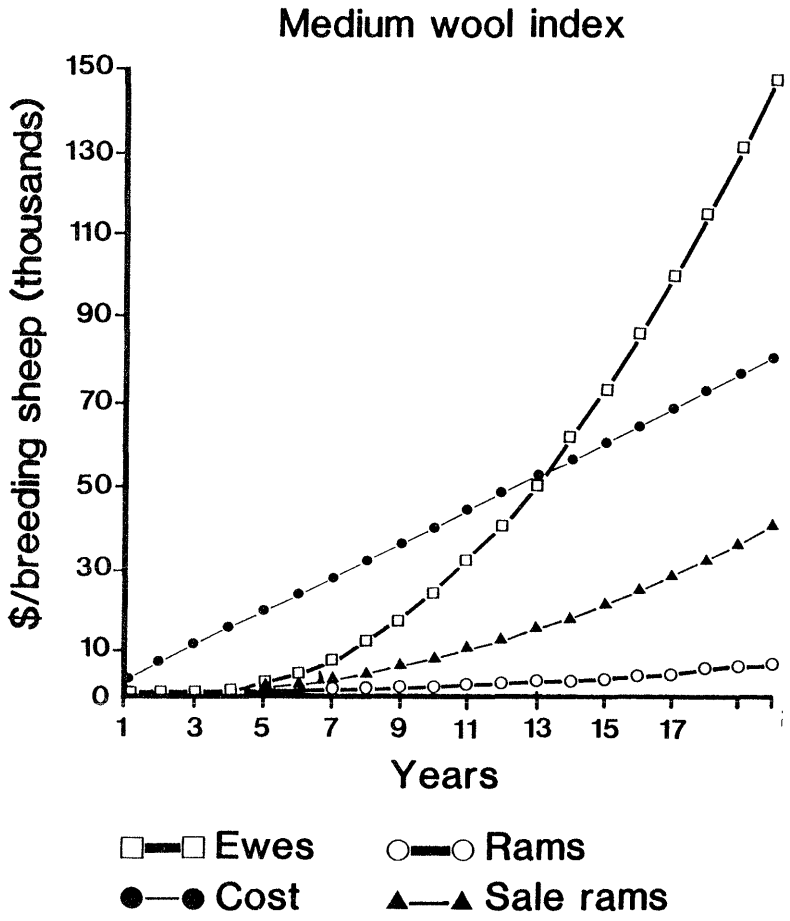

Figure 2. Medium wool. Cumulative costs and returns using Index Selection in a 1000 ewe study flock. Both rams and ewes measured, sale rams - individual value only (see text)

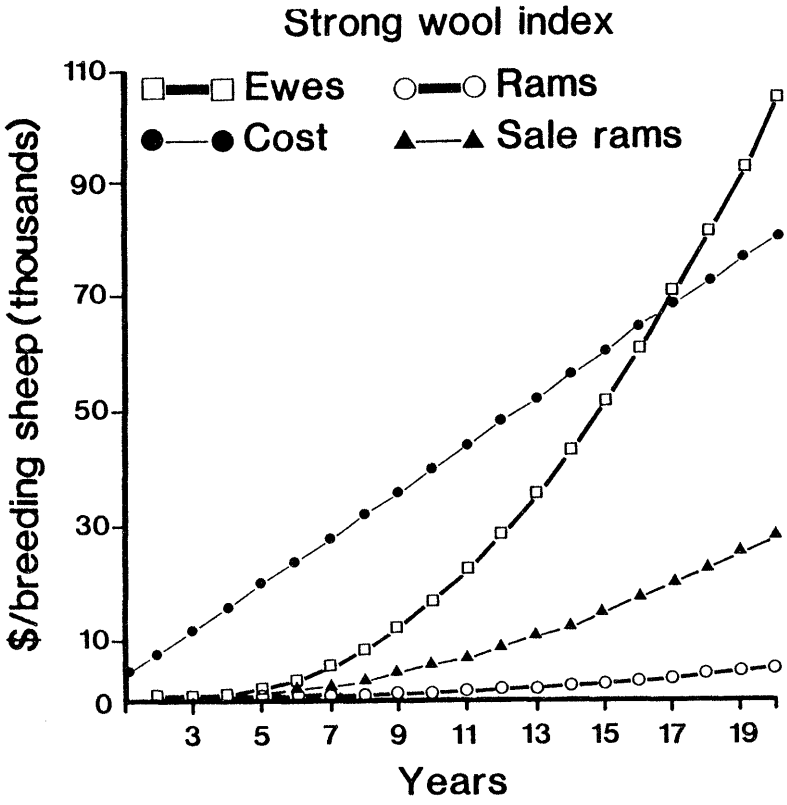

Figure 3. Strong wool. Cumulative costs and returns using Index Selection in a 1000 ewe study flock. Both rams and ewes measured, sale rams - individual value only (see text)

Most of these returns accrue through ram buyers paying more for higher performing sale rams. If this did not happen the costs of objective measurement are still covered by the extra wool income generated by the ewe portion of the flock after 9-14 years.

Commercial breeders with medium and strong wool ewe flocks should not bother measuring ewes for CFW and FD, as the cost involved will not be covered by extra wool returns. With fine wool Merinos the cost was not recovered until after 14 years of accumulated gain. This

Table 3. Accumulated extra returns and costs in a commercial ewe flock with or without 20 years of selection of ewes using a selection index, assuming rams are purchased from a stud using index selection

Sheep Type	Ewe Selection	Extra returns Ewes (*wethers)	(x$1000) Difference with ewe selection	Extra Costs
Fine	+	170	67	40
	–	103		–
Medium	+	102	41	40
	–	61		–
Strong	+	71	27	40
	–	44		–

* extra returns in a wether flock will be similar to the returns in a ewe flock with no selection.

assumes the response to selection for fineness will be linear for 14 years, i.e. 4.4 microns finer/14 years. There is probably a physiological limit to fineness response.

The benefit/cost ratio is highest for the index selection. This should be the preferred selection method of stud breeders who are not concerned about certain fibre diameter strains being better adapted to particular environments; those who accept that finer woolled sheep will have reasonable mating weights and fleece weights. As seen in Table 2 there is a substantial loss in keeping FD constant, given the premium for finer wool in the current market. Breeders who have clients who want stronger woolled rams could run a subflock for this purpose.

The best approach for a commercial breeder would be to purchase rams from a stud breeder with the same breeding objectives. Prices should be based on the ram's genetic merit, calculated by the relevant index or selection criteria. Ewes should be selected on greasy fleece weight only.

The benefit/cost of measuring both rams and ewes is favourable in studs as the extra response to ewe selection covers the costs of testing. In commercial flocks running and breeding both ewes and wethers, the costs of testing ewes may be justified if there is a continuing response to selection.

A breeder may also want to consider the structure of the breeding enterprise.

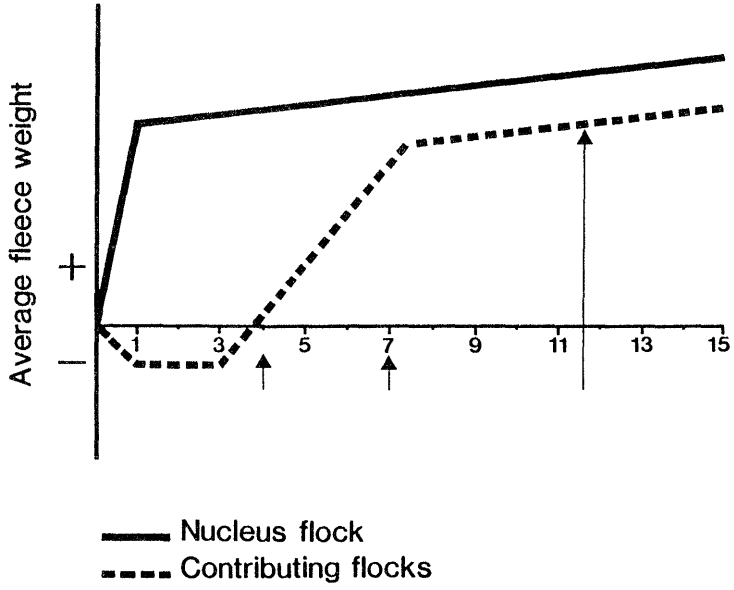

Figure 4. Progress of fleece weight in nucleus flock and contributing flocks

It can be shown theoretically that an open nucleus scheme (e.g. group breeding scheme, GBS) is 10-15 percent more efficient in the response to selection than a closed nucleus scheme (e.g. traditional stud structure) due to the greater selection on the path of dams to breed males, more than compensating for the lesser selection on the path of sires to breed females (James, 1977). The rate of inbreeding is halved, which can be important when the total flock population is small. The predicted

progress in GBS is shown in Figure 4 and the optimum structure of schemes is shown in Figure 5.

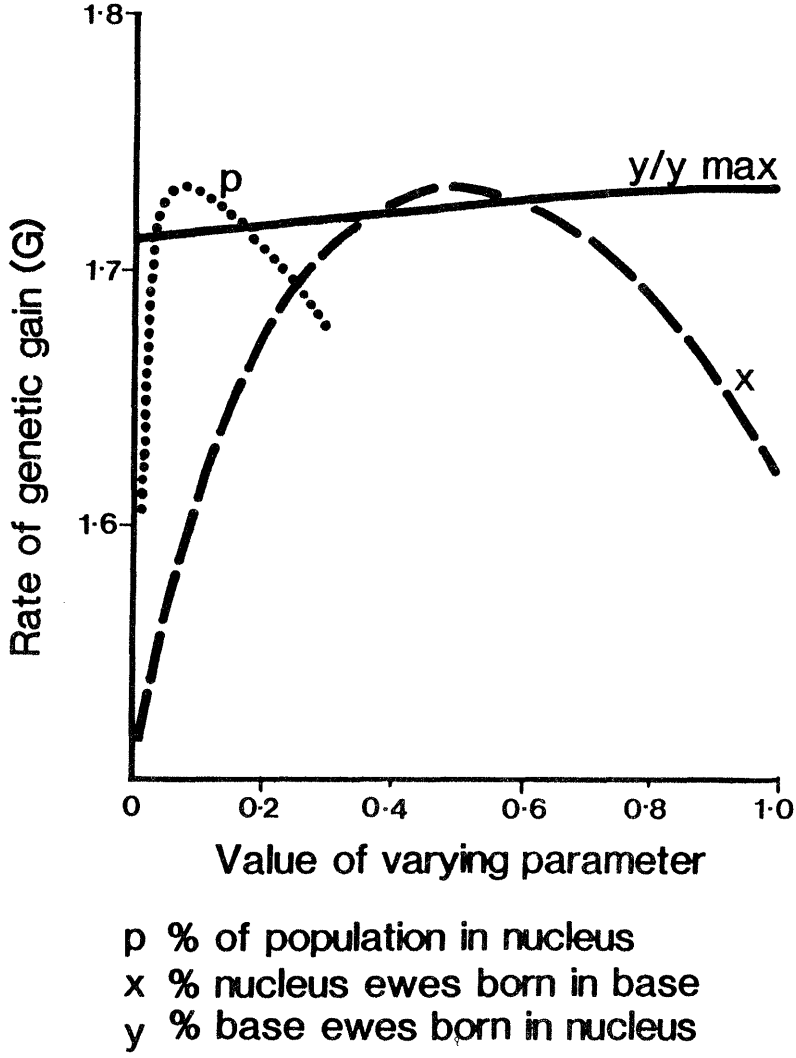

Figure 5. Sensitivity of steady rate of genetic gain (G) to variation in one parameter while others are kept at the optimal values (1% males kept, 80% females kept) James (1977)

Principle 3: In group breeding schemes about 10 percent of the population should be in the nucleus, half of the nucleus female replacements should come from the base population, and all nucleus-born females not needed as nucleus replacements should be used in the base population.

The decision to join an established GBS can be made on the basis of the superiority of the potential contributing flock. If the contributors are all in similar environments then one shouldn't join (unless selfless) if the average EBV of the flock is s_p above the average EBV of the GBS (with similar contributors) or $2s_p$ above the EBV (with contributors of varying merit), e.g. 0.4 or 0.8 kg FW (del-Bosque-Gonzalez and Kinghorn, 1987a). The difficulty of course, is evaluating the EBV of flocks in different environments. Variations in size and EBV of contributing flocks have small effects on rates of gain, the greatest response occurring if more sheep are taken from flocks with the highest EBV (del-Bosque-Gonzalez and Kinghorn, 1987b).

It is probably better to have a set proportion of each flock contributing to the nucleus, than to take a set number from each flock, as the latter will result in a high percentage of ewes being taken from smaller flocks, which may have lower EBVs.

If all the flocks involved in a GBS are run in different environments then an open scheme is only superior to a closed scheme (or stud) when the genetic correlations between environments is over 0.55 (del-Bosque-Gonzalez and Kinghorn, 1987c). For a GBS to be worthwhile performance in all the environments needs to be highly related, i.e. little G x E interaction.

These considerations can be used to evaluate a GBS, e.g. the recently formed Otago Merino GBS (Jopp, pers. comm.). This scheme selects nucleus females by culling hoggets above average in micron, or over 19 micron and

then selecting the best 50 on CFW. This selection method (independent cull levels on FD and single trait selection on CFW) is not as efficient as index selection (Index 1.1 or 1.2, Table 1). For example a flock with high feed levels and low stocking rates may have its heaviest wool cutting 19.1 micron sheep culled, along with a 16 micron ewe ranked 51 on CFW. While these are extreme examples, they show the problems of not using an index of overall fleece value. The scheme proposes to have all members contribute 10 hogget ewes/year and receive 2-4 rams/year. This suggests the size of the nucleus is well below 10-20 percent of the base population (assuming 20 contributors). Another policy is to have the fraction of nucleus ewes replaced from the base $\geq$50 percent, instead of 40-60 percent.

Both these policies result in rates of genetic gain below the optimum, essentially because the size of the nucleus is too small.

This may be because the GBS is a trial for the contributors, who don't wish to commit valuable resources until the GBS is proved successful. It is an unfair trial of the GBS concept, as the predicted rate of gain is not much higher than a traditional closed structure. This can be seen from the fact that only 2-4 rams/year will be sent to contributors flocks, mating only 100-200 ewes. The rams' impact will be relatively small in larger flocks. However the scheme can be a very valuable forum in which ideas and information are exchanged.

Another alternative to forming a GBS is to breed one's own rams in a nucleus flock, selecting rams by objective measurement, e.g. Rivcol, Wagga. The costs and returns from the ram breeding enterprise can be compared with those from a wether enterprise occupying the same area of land. Morley (1987) studied this comparison, assuming 10 percent rams were culled at weaning, all were fleece weighed ($1.20/hd), 50 percent were tested for CFW and FD ($3/hd), 15 percent were tested for fertility and serving capacity ($7.30/hd) and five percent were retained. His analysis suggested each ram retained had a

comparative cost of $A288, $A242 if no objective measurements were made, $A262 if GFW only was recorded. However, this analysis did not compare the costs of purchasing selected flock rams from studs with a comparative EBV and possible sales of surplus rams. Such a study is more difficult and complex to model and is beyond the scope of this paper.

Pasture development

The principles of improving pastures in high country have been detailed by Allan, 1985; Allan et al. 1985 and Pedofsky and Douglas, 1987. The potential returns from oversowing, topdressing, fencing, irrigation and rabbit control are described by Pedofsky and Douglas, 1987. Figure 6 shows the wool production for Tara Hills High Country Research Station where, in 1985, 13.4 kg wool/ha

was produced compared to a high country average of 3.5 kg/ha. This development obviously costs money, but the potential returns are substantial.

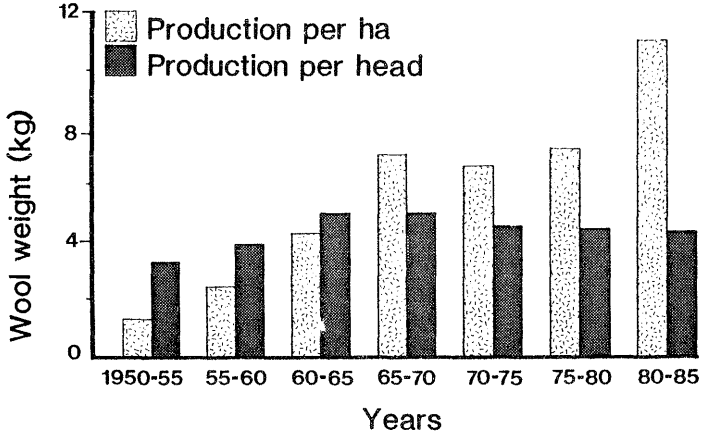

Figure 6. Tara Hills High Country Research Station. Wool Production 1950-1985. Pedofsky and Douglas (1987)

Oversowing usually occurs in early August on low sunny faces to late September on high shady faces. Legume seed needs to be inoculated and mob stocking can be useful to trample seed into the ground. The species usually sown are listed in the Proceedings of the 1985 Hill and High Country Seminar (p.57). Generally cocksfoot, maku lotus and lucerne are used in drier, hotter areas while ryegrass, white, red and alsike clovers are used in wetter areas.

Principle 4: The best utilisation of oversown tussock country occurs when the country is rotationally grazed at high stocking rates, i.e. increased subdivision is required.

An example of this is shown in Figure 7.

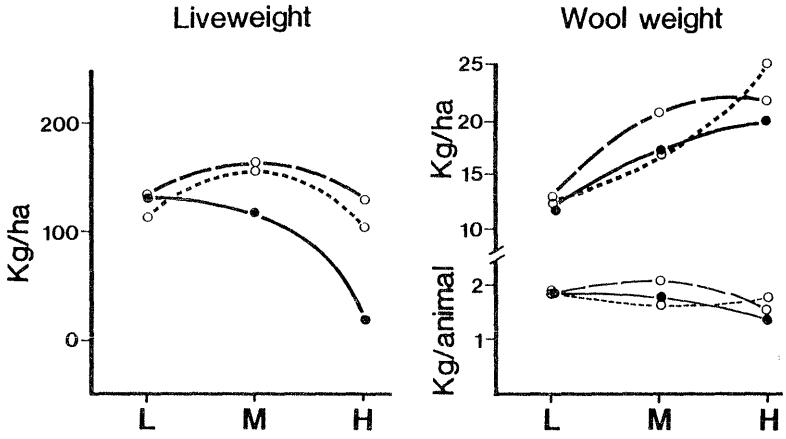

Figure 7. The response in Merino hogget liveweight gain (kg/ha) and clean wool growth (kg/animal and kg/ha) to stocking rate of different management practices on oversown tussock country. L low, M medium, H high stocking. ○-----○ continuous, ○——○ alternating •——• rotational grazing (2-3 weeks). Allan et al. (1985)

Brown (1981) described the principles of tussock country management as:

- set stocking from lambing to weaning, rotating the ewe hoggets around three or four blocks.

- rotationally grazing ewes post-weaning, moving up to higher altitudes.

- flushing and mating on the high oversown blocks and moving stock down as desired to graze top growth.

- rotationally grazing ewes and hoggets at one block/week in winter. Some supplementary feeding needed in drier areas.

Feeding different classes of stock for wool production

When the feed supply is limiting during periods of the year, it is necessary to understand the feed requirements of different classes of stock to assess their priority for different pastures and/or need for supplementation. An understanding of ruminant metabolism enables the prediction of wool growth responses to various feed supplies.

Ewes
Wool follicles in an unborn lamb are initiated up to the time of birth and maturation of the follicles continue for the first 4-5 months of life. At birth only about 20 percent of the follicles are producing fibre.

Principle 5: Poor nutrition of the pregnant ewe can limit the initiation of follicles in the foetus and this will be a lifetime limitation.

It is difficult to quantify "poor" nutrition, as most experiments conducted have studied extreme levels of feeding. If the ewe experiences "poor" nutrition during lactation, the reduced milk production can delay the maturation of follicles and permanently reduce the ability of these follicles to produce fibre in later life.

Subsequent adult production of lighter, coarser fleeces cause lower fleece values. This is an environmental effect, not genetic, so sheep subjected to these conditions will breed better sheep than their phenotype suggests. Therefore at selection time, some corrections should be made for sheep from ewes with poorer nutrition. This "maternal handicap" also results if sheep are born and reared as twins or if sheep are born from maiden ewes (0.1-0.2 kg CFW/year less production). Schinckel (1953) found that the secondary/primary fibre (S/P) ratios in 15 month old sheep for singles ex adult, singles ex maidens, and twins ex adults were 17.3, 15.5 and 13.8 respectively.

Short (1955) found that adverse maternal nutrition resulted in a six-month fleece with higher FD (22.9 v 20.7) and lower S/P ratios (9.8 v 13.9).

Table 4. Measurements performed on sheep at 2-3 years of age following different pre- and post-natal nutritional environments. At time of measurement, each sheep was offered a good quality diet, in proportion to its liveweight

Treatment	H/H	H/L	L/H	L/L
Liveweight 2 years (kg)	53	48	49	44
No. of Fibres (millions)	64	69	58	44
Fibre Weight (g)	37	30	37	37
Wool Growth g/day	8.7	7.6	7.9	6.9
Secondary to Primary ratio	22.3	21.2	23.0	16.5

Source: Schnickel, P.G., and Short, B.F. (1961)

Schnickel and Short (1961) studied the effects of nutrition during pregnancy and during the first four months of lactation (Table 4). These studies indicated that pre-natal nutrition affects the number of fibres per sheep, the body

size and skin area of the sheep, while post-natal nutrition mainly affects the amount of wool grown and follicle maturation. Once the lamb is five months old maturation of follicles is complete and it is resilient to poor nutrition. In contrast to the pre-weaning period, post-weaning nutritional limitations have little permanent affect on wool production. This also appears to be the case with body weight (see Table 5) where a growth check before weaning can cause a permanent live weight disadvantage.

Table 5. Experimental nutritional treatments and bodyweights at different stages of the experiment

Group	Preweaning nutrition (0-6 mths)	Weight at 6 months kg	Post-weaning nutrition (7-12 mths)	Weight at 12 months kg	Post experimental period Weight at age 18 mths, (kg)	Weight at age 48 mths, (kg)
H.H.	High	28.0	High	35.3	50.3	59.6
H.L.	High	28.5	Low	24.4	48.9	59.0
L.H.	Low	20.6	High	28.2	44.3	56.5
L.L.	Low	20.9	Low	20.2	41.7	55.7

Source: Allden, 1970.

Everitt (1967) studied the residue effects of pre-natal nutrition on the wool production of Merino offspring at 18 months of age. Grazing Merino ewes were run at different stocking rates. At 90 days post-conception the High (H) group weighed 41 kg and the Low group (L) 32 kg. Each group was then divided and given high and low pasture allowances until 140 days post conception, at which time the ewe liveweights were 52, 47, 44 and 38 kg for the HH, LH, HL, LL groups respectively. The S/P ratio in 18 month old offspring from these four groups were 15.8, 14.3, 14.2 and 11.6 respectively. Everitt (1967) concluded that nutrition from 0-90 days was only important if lambs were sold, as it only influenced lamb growth rate for about seven months, whereas from day 90-140 nutrition had the residual effect reported by Short and Schnickel (1961) of producing lighter, coarser fleeces.

Hutchinson and Mellow (1983) also found these affects in Scottish Blackface sheep, despite their higher FD and lower S/P ratios. Primary follicle initiation was not influenced by pre-natal nutrition, whereas secondary follicle initiation was lowered by underfeeding (0.5-0.7 x requirements) from day 115-135. Poor feeding up to day 115 had little effect on S/P ratios at birth. Contrary to these studies Williams and Henderson (1971) found pre-natal nutrition had little effect on follicle initiation in Corriedale lambs but influenced subsequent maturation. This result is similar to those cited by these authors for Romneys (Wildman, 1958) and Cheviots (Ryder, 1955).

In summary, during the last five weeks of pregnancy a ewe should receive adequate nutrition (60 MJ ME/week) or her offspring will suffer from lifetime wool return losses, which will be financially severe if fine wool receives a high premium. Lactating ewes have the highest energy requirements of 100 MJ ME/week in the first month and 80 MJ ME/week for the next two months. Less adequate nutrition may permanently affect the wool production of unweaned lambs, although Allden (1970) and Langlands et al. (1984) found wool production of adult ewes was not affected by their stocking rate as unweaned lambs.

Weaned lambs and hoggets

It is only under the most extreme conditions that permanent damage will result from nutritional stress as a weaned lamb. The most damaging consequence is the loss of production that occurs during the stress and recovery periods. In the case of weaned lambs poor maiden reproductive performance could be expected due to the lower body weights at first mating. Compensatory growth occurs in weaned lambs if conditions improve. This growth is more economic than supplementary feeding of weaned lambs for production during poor summer periods. Under Australian conditions it is not economic to feed oats or lupins for survival unless more than seven percent of weaned lambs would otherwise have died. It is usually not economic to improve wool growth or body growth and subsequent reproductive performance by supplementation

(Scarlett, 1982). A satisfactory weaning weight is considered to be 20 kg. When feed shortages occur lambs can be weaned at 13 kg provided they are placed on the best (high protein) feed available on the property. Weaned lambs need to be 32 kg before experiencing the first feed shortage period (summer) or their survival rates decline rapidly.

Feeding of hoggets affects their survival through winter and as they are still growing their protein requirements are relatively high (8-10 percent CP). The first mating of hoggets will be more successful the higher the liveweight (greater than 35 kg) they achieve by autumn. This is because of the relationships between ewe liveweight and ovulation rate (each extra kg = two percent extra ovulation rate, Morley et al. (1978) and between ram liveweight, testes size and sperm production.

In Australia nearly all ewes are joined for the first time when they are 18 months of age. The maiden ewe flock should be mated and lambed separately from adult ewes. There is no merit in waiting until ewes are 4-tooths before joining. Even the subsequent reproductive efficiency of ewes joined at seven months of age is normal.

Stocking rate

Wool production/head is an important selection criteria, but wool production/ha is more closely associated with economically efficient wool production. Wool production/head often declines linearly with stocking rate (Wool/head = a - bx (sheep/ha), Jardine et al. 1975, Langlands et al. 1984). If this is the case, then wool/ha is curvilinearly related to [a - bx (sheep/ha] x sheep/ha.

The maximum wool/ha ($a^2/4b$) is attained at a stocking rate of a/2b. The economic optimum stocking rate will be lower than this (McArthur and Dillon, 1971). As stocking rate increases, the length, strength, fibre diameter, colour, handle and character of the wool decreases (Langlands et al. 1984).

Principle 6: The most economic stocking rate is a complex decision involving production per unit area, maximum stability of pasture, minimum stress to animals, maximum soil conservation, appearance of livestock and managers attitude to risk.

The importance of maintaining a flock during seasonal feed shortages means there is a minimum liveweight, which the flock should be kept above. As stocking rate increases the minimum liveweight decreases by about 1.5 - 2 kg with each extra sheep/ha, clean fleece weight decreases by 0.15 - 0.2 kg/head, and fibre diameter declines by 0.25-0.35 microns. The lower fibre diameter only partially offsets the economic effect of a decreased fleece weight/head, but can increase returns on a per hectare basis. The differences in fleece weight and fibre diameter, caused by higher stocking rates, arise mainly during the seasonal feed shortage period, so staple strength could be reduced.

Despite limited availability of herbage, highly stocked sheep often consume more feed/head than lightly stocked sheep. This feed is not used as efficiently, probably because there is less green feed consumed. Sheep grazing natural pastures at Trangie, when allowed access to dryland lucerne for only one day/week, increased wool production by 11 percent (Williams, 1982).

In summary, improvements in wool production/ha require increases in available pasture during critical periods. Further increases in efficiency come from running genetically superior sheep which respond to favourable feed conditions in spring. With a seasonal feed supply, a larger increase in annual fleece weight obviously occurs with a percentage lift in production during the period of maximum wool growth. Wool production of sheep during this period is still limited by a scarcity of sulphur amino acids (SAA).

Supplementation for wool growth

As wool fibres consist almost entirely of protein, with a high SAA content (9-13 percent) it is not surprising that wool growth responds to supplements of protein, in particular SAA, that are undegraded in the rumen and reach the intestines for absorption. A Merino with 3.3 kg CFW deposits about 9 g protein (1.5 g N, lg SAA) daily in wool. As the efficiency of wool production is only about 12 percent in relation to absorbed protein, about 75 g protein must be absorbed daily to produce this wool. Rumen microbes only supply about 20-50 g protein/day, so some undegraded (bypass) feed protein must reach the intestines to achieve reasonable wool growth rates. A pasture or supplement, e.g. grain, silage, or hay, is used more efficiently for wool growth if it contains high levels of bypass feed protein, high in SAA content.

In practice, farmers on grass-feeding systems can only feed the material they have available. However, knowledge of the factors controlling wool growth should enable R & D personnel to develop better pasture species and supplements and to predict or model wool production changes in different management and feed supply situations.

Flock health

There are a large number of diseases which do not cause obvious symptoms and often are only suspected when production records are examined.

Principle 7: Observation, recording and good management planning are of paramount importance to good preventative health practice on the farm.

A successful farmer needs to know the normal behaviour of sheep, so that anything wrong is quickly recognised. One needs to be able to accurately describe symptoms to assist in any investigation into health problems and be aware of any recent changes that have occurred environmentally or through management. Hazards should

be identified on a property e.g. poisonous plants, swampy areas (fluke), low dams (algae). Good observation can stop diseases before they happen. A farm diary should be written up every day. Dates should be recorded when stock are changed from paddock to paddock, when they are drenched, vaccinated, marked, shorn, crutched, jetted etc., when rams are put in and out and the date of weaning. Records should be made of shearing and marking tallies, or whenever stock are counted.

The first indication of a disease may be when variations occur in records compared to previous records, e.g. dropping lamb marking percentages. Better records assist investigations into flock health problems, and with microcomputers, they are easier to keep and retrieve.

A calendar of yearly husbandry operations should be planned in advance. It is beyond the scope of this paper to detail drenching, vaccinating and footrot control programs (see Familton, 1981), but advice on these issues is available for all regions.

There is a growing trend in Australia for groups of graziers to employ a veterinarian full time to monitor production levels in their flocks and pick up diseases before they become chronic. Many of the computer-based health programs now being used by the Department of Agriculture, e.g. Drenchplan, are based on preventative measures rather than curative.

Clip preparation

Factors which influence the method of classing within individual clips are (i) the class of wool - whether Merino, Halfbred or Crossbred, (ii) the size of the clip - more lines can be made in a large clip, whereas in a small clip more blending of lines is required to avoid star lots and (iii) the properties of the clip - the higher grade wools require more care in preparation than lower grade wools, where a greater variation of type is acceptable to the manufacturer.

Principle 8: Attention to clip preparation is more important the higher the quality or grade of the wool, as the penalty for wool faults is more severe.

Clip preparation has been discussed by Tinnock (1982).

Stains, e.g. urine and coloured fibres, must be kept out of main fleece lines, as white tops exceeding a limit of 10 dark fibres/100 g can suffer a reduction in value of 4-15 percent (Foulds et al. 1984). This is the equivalent of one dark staple/10 fleeces, or four staples (1 g)/bale of wool, or 10 g dark fibres/tonne wool or 10 dark fibres/million white fibres. As individual farmers have only a 1/1000 chance of this level of contamination being detected in core samples, detection is done at the top stage, by which time the wool has been blended with other wool and is therefore anonymous. The problem is therefore difficult to control.

The economics of classing out a small, finer line from the main line is risky. If done visually on the basis of quality number (QN) and handle the very poor relationship between fibre diameter and QN, combined with the extra selling costs of creating another line make the practice of little benefit. If done objectively by using individual test results on sheep, the practice will only benefit wool returns if the fine line is in a micron range with a higher linear Price/FD relationship than the main line. After adding the extra selling costs to the test costs and sheep drafting or wool handling costs and allowing for the broadening of the residual main line, this practice will often result in no net benefit. Unfortunately the commercial success of the practice cannot be estimated until the test results are obtained, the micron range is known and the expected market prices determined.

Finally as part of clip handling, if midside samples of wool are being removed from sheep for yield and FD determination it is vital that samples are taken from a consistent site on each sheep. As these variables change from site to site on the sheep it is obvious that samples taken from other sites, e.g. neck, breech, belly and flank,

are a waste of time for sheep selection and would be better sold as part of the clip.

Summary

Fine wool income can be improved if these principles are followed:

1. Run fewer, sounder, superior rams,
2. Use objective measurement and index selection,
3. Have an open rather than closed nucleus structure for breeding rams,
4. Rotationally graze oversown tussock country with high stocking rates,
5. Feed ewes well in late pregnancy,
6. Try to find the most economic stocking rate,
7. Observe, record and plan for preventative health control,
8. Skirt and class the clip to maximise net returns.

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Maximising fine wool income — Practice

Mr Robert Jopp*

We are in the midst of an exciting revival of the fine wool industry in New Zealand and are possibly poised to make major production advances with the more concentrated use of genetically superior sheep. But, at the same time, the very existence of the fine wool industry in its traditional home of the South Island high country is possibly more threatened than any other time for 30 years by the old basics - "our fathers problems" - rabbits and provision of quality feed.

Table 1. Fertiliser expenditure in Central Otago

Source: Pedofsky, Ibbotson and Cooney, Alexandra, pers. comm.)

		1985	1986
Total fertiliser expenditure by clients		m$3.258	$1.623
Expenditure per stock unit (Fine wool sub sample)	High	$5.16	$2.62
	Low	$1.14	$0.01
	Average	$2.45	$1.35
Meat and Wool Board's Economic Service estimate of maintenance requirements			$5.00

*Moutere Station, Alexandra

There are increasing areas of Central Otago and the Mackenzie where rabbits are severely limiting income and the figures in Table 1 tell their own story about fertiliser maintenance, even in one of New Zealand's main Merino wool growing areas.

We may have to be very careful to ensure that such basic requirements do not once again become the major limitation to the production of any fine wool income at all, let alone maximising it.

We are all well aware of the new economic climate in which we operate - very different from the 1970s and early 1980s when our big increases in production came from major pasture development programmes. These are now things of the past.

Providing we are able to maintain that development then the future means of improving fine wool income will depend on "fine tuning" our farming operations rather than the grand scale development of the past. Fine tuning will produce less dramatic results and will require a different psychological approach which many will have difficulty accepting. For a start, we should emphasise nett income more than gross income. Careful planning and long term consistent actions will be required to produce results - which will also tend to be long term.

A major element of this fine tuning - and a future major contributor to increased nett wool income - will be increased emphasis on genetic improvement of our sheep.

This will occur because:

- There are now clearly demonstrated differences in genetic performance which in turn produce major income differences. This is shown in the Central Otago Merino wether trial. (Table 2).

- There is widespread interest in genetic improvement throughout the Merino industry e.g., large attendances at stud Merino tours, ram sales, wether trials and the

establishment of many new studs and a group breeding scheme.

Table 2. Production example Central Otago merino wether trial

Av. Yield	Greasy Wt	Clean Wt	F. Dia	Fleece Price Clean c/kg	$Wool value	Liveweight kg
.83	7.18	5.80	23.30	758.00	42.70	49.80
.79	7.04	5.38	22.30	815.00	42.22	48.80
.70	6.78	4.63	19.90	963.00	42.12	54.80
.72	6.72	4.66	22.00	827.00	36.99	55.80
.77	5.82	4.35	21.60	855.00	35.31	43.80
.80	7.46	5.80	26.10	607.00	35.20	45.00
.75	6.52	4.72	23.10	767.00	35.01	54.20
.76	6.44	4.74	24.50	668.00	31.17	48.80
.75	6.32	4.60	24.60	664.00	30.08	52.00
.73	6.14	4.33	25.60	610.00	26.39	48.20
Top 7 Average				Top 7 Total		
.76	6.79	5.05	22.61	798.86	269.56	50.31

averages are calculated from the top seven animals ranked on fleece value

- Now that Merinos are being fed better, the genetic factors limiting their performance are becoming more apparent.

- Genetic gains are cumulative and permanent (Figure 1), they can't be removed by rabbits, shortage of tucker, nor even by Roger Douglas!

- Changes in tax treatment of development and livestock will make development prohibitive when it is non-deductible but one of the few good things about the new livestock taxation system is that it encourages the breeding of superior stock.

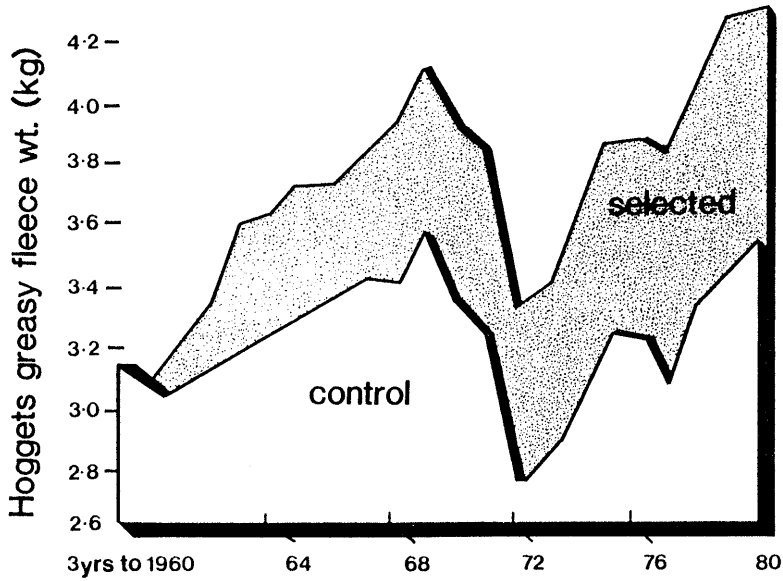

Figure 1. Massey fleece weight selection flock results

- We now have some very useful techniques - "tools" if you like - to increase the speed of genetic gain e.g., computers, artificial insemination and embryo transplants. The creation of "designer sheep" with the use of genetic engineering techniques may not be far away.

The basics of performance breeding in Merinos are fairly widely known and I only want to look at three topics where I feel we have problems:

- Commercial flock selection programmes
- Accuracy of performance data
- Use of that data for comparisons.

My opinions on these subjects are, of course, coloured by my background as a stud Merino breeder, albeit one committed to the sound, practical application of modern genetic principles of performance breeding. Objective measurement and managing to ensure selection accuracy has been a "way of life" at Moutere for 40 years. We

have had plenty of time to find out that performance breeding works but it is not a panacea for all breeding problems.

Commercial flock selection programmes

I think that in New Zealand (and especially in fine wool flocks) we have a tendency to get carried away with the techniques of genetic improvement (i.e., the electronic gadgetry) rather than concentrating on objectives and how to achieve them. In setting up a breeding programme in a commercial flock situation we need to consider that:

- Up to 90 percent of our genetic gain will depend on the rams we use.

- The programme has to be consistently carried out for a long time to produce results.

The importance of rams is obvious - hence Dr Cottle's advocacy of fewer, sounder rams. Also obvious, if we think about it, is the relative unimportance of a single ram in a flock situation and the consequent importance of the selection of your ram breeder, rather than the selection of individual rams.

Dr Cottle quoted the cost of breeding rams in Australia compared with running wethers in their place. The cost of a ram bred with full objective measurements in 1987 was N.Z.$351 I would think the average N.Z. Merino ram price in 1987 was still around this figure - $350. This emphasises the commitment that N.Z. fine wool ram breeders have made to producing quality rams at a reasonable cost for our traditional clients. Possibly that approach has to change - there may be more demand for individual superior rams which will, of course, cost the earth! I hope this does not occur at the expense of our traditional high country clients.

This brings me to ewe selection. There is a wealth of evidence to show that, assuming we are able to winter sufficient hoggets, then selecting on greasy fleece weight

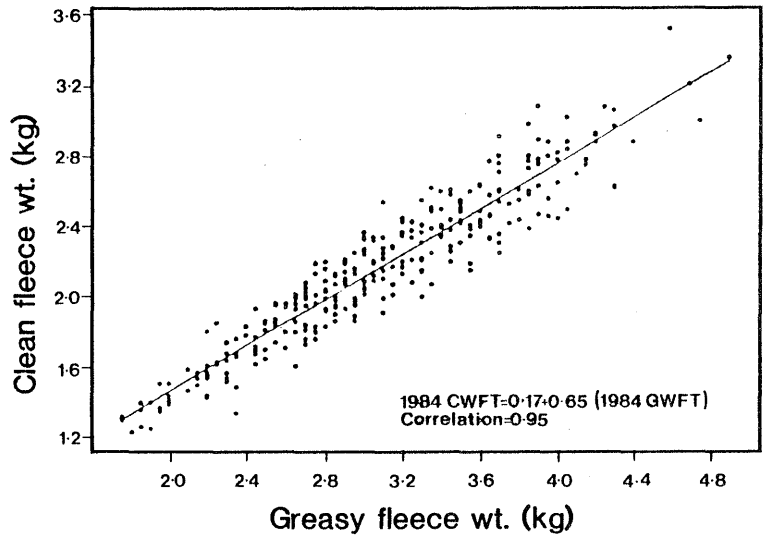

Figure 2. Phenotypic correlation between 1984 clean fleece weight and 1984 greasy fleece weight

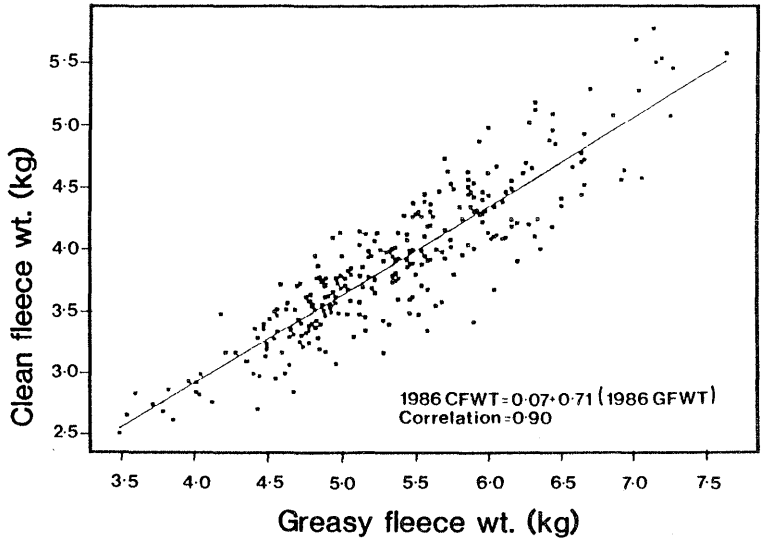

Figure 3. Phenotypic correlation between 1986 clean fleece weight and 1986 greasy fleece weight

alone is the cost effective system. As Figures 2 and 3 show the correlation between greasy fleece weight and clean fleece weight is very high.

In his paper Dr Cottle demonstrated that the cost benefit of more expensive, complicated systems such as including measured yield and fibre diameter, is suspect, even in a fine Merino flock - unless the objective is ram breeding. Any system has to continue for many years to produce results and an expensive, complex one is highly likely to be abandoned before real benefits have accrued. Usually this occurs because of financial stress - for example the dairy industry's herd testing programme.

Selection on greasy fleece weight is simple, cheap, interesting and effective. Selection for fibre diameter can be done through the rams and possibly eye appraisal to cull the strong edge.

Dr Cottle has stated that subjectively assessed traits such as confirmation and wool colour have low REV's i.e., relative economic values. This may be so today, but I would suggest that this is because continual selection pressure on these traits in the past has reduced the incidence of faults to a negligible level. Further, if selection pressure is not maintained for these traits (resulting in very low culling levels anyway) then these traits can become REPs - real economic problems.

To sum up on selection in flocks - if 90 percent of genetic gains comes from the rams, then I suggest 90 percent of the money and effort that goes into selection, should go the same way.

It is axiomatic that performance breeding depends on accurate data on which to base selection. Accuracy is especially important as we place more emphasis on the identification of top individual sheep rather than top performing groups of sheep. Two aspects of accuracy concern me.

Firstly, managing for accuracy. Day to day management of a performance bred stud must ensure that comparative performance data reflects true genetic differences. This means that sheep to be compared with each other must be run together and in an environment that is comparable to that of commercial flocks. Luxury-style treatment for a few sheep from a mob completely eleminates them from comparison with the remainder of the mob. Even when all possible care is taken in management to ensure data accuracy, significant differences in performance may arise without being immediately obvious. These could be due to influences during lambing - even during gestation as Dr Cottle has explained -such as paddock to paddock differences.

Secondly, in N.Z. much of the performance data we base our selection on is obtained from the sheep as a hogget - say 10-12 months old. Further the hogget usually has not been shorn as a lamb - i.e., the lamb tip is present in the test wool sample. The heritabilities of fleece weight and fibre diameter at 12 months are not significantly lower than those at 18 months or 30 months and the repeatabilities are very high (see Table 3).

Table 3. Repeatabilities for greasy fleece weight, clean fleece weight, fibre diameter and staple length

	1984-85	1985-86	1984-1986
Greasy fleece Weight	0.72	0.90	0.66
Clean fleece Weight	0.71	0.89	0.66
Fibre Diameter	0.80	0.92	0.81
Staple Length	0.65	0.77	0.61

Note: Sheep were hoggets in 1984.
Source: Central Otago Merino Wether Trial

Thus in a group situation, culling on 12 month fibre diameter or fleece weight will be fairly accurate. The problems arise when we are selecting individual sheep as in ram selection (see Table 4).

Table 4. Individual fibre diameter changes

	Hogget 1984 Hogget F.D.	Rank	2Th 1985 Rank	2Th F.D.	F.D. Change 1985-1984 F.D.	
	20.1	5	6	22.6	2.1	
	20.9	7	7	23.0	2.1	
	18.0	1	1	19.4	1.4	
A	19.1	3	4	21.5	2.4	
	21.2	8	10	24.4	3.2	
	18.5	2	2=	20.7	2.2	
	19.9	4	2=	20.7	0.8	
	20.2	6	5	22.0	1.8	
	22.1	9	9	23.6	1.5	
	22.7	10	8	23.5	0.8	Av.=1.8
	18.8	7	9	20.7	1.9	
	17.9	1	4=	19.7	1.8	
	19.9	10	10	21.0	1.1	
	18.0	2=	4=	19.7	1.7	
	19.2	8=	3	19.4	0.2	
B	18.1	4	2	19.0	0.9	
	18.0	2=	1	18.8	0.8	
	19.2	8=	7	20.1	0.9	
	18.4	5	6	19.8	1.4	
	18.7	6	8	20.3	1.6	Av.=1.2

It is possible the inclusion of the lamb tip in our wool samples could be the cause of much of the problem. In Australia some of the test houses will not test samples with a lamb tip. The obvious solution is to shear the lambs in the autumn to remove the tip - this is certainly possible in Marlborough but it is a bit difficult in Central Otago because of our climate. Another partial solution is to re-test rams at 18 months but by this time most have already been sold.

Because of the influence hogget fibre diameter can have on the sale price of a ram, it seems to me that it is

important that means are found to give us more confidence in this measurement.

Comparison of sheep

To identify top sheep we must be able to make valid comparisons between sheep. This is easier in a "within flock" situation than "between flocks" but in general the difficulties and means of making valid comparisons in either situation are not well understood.

How often do we hear a ram being quoted as an "18 micron ram" or "cut 20 kg"? These are totally meaningless figures quoted by themselves yet their use is widespread, even by organisations that should know better (e.g., MAF - "Southern North Island Merino Breeders Newsletter" and Elders Breeding Services -"1986 Ram Directory").

In particular, this "micron madness" where a single fibre diameter figure is quoted as "god" could well land our industry alongside the lunatic fringe of the goat industry, where the motto seems to be "a fool and his money deserve to be parted."

To make valid use of performance figures of individual sheep we need to know:

- something of the background of the flock the sheep comes from;

- details on date of birth, date of test, age at test, months of wool growth and number of sheep in the test group;

- How the individual's data relates to the performance of the entire group. This is shown in deviations from average and these deviations are the important figures - not the actual fleece weights or fibre diameter.

The details shown in Table 5 about the stud and its sheep on offer enable someone who knows nothing about that

Table 5. Australian OM ram sale catalogue entry

Average flock fleece line fibre diameter last five years	19.5 um
Average ram fibre diameter over last five years	18.8 um
Details of ram group from which sale team was drawn	
Lambed	Sept/Oct.1980
% Drop tested	75%
Age when tested	12 months
Date shorn	17.9.81
Wool growth when tested	7 months
Average yield of all rams tested	75%
Average fibre diameter of all rams tested	18.5 um

Pen	Tag	CFW%	Y%	um Dev.
1	29	124	80	2.0
2	81	115	75	-0.2
3	96	120	78	0.6
4	105	109	74	-1.8
5	200	128	78	1.5
6	194	119	81	0.0

Source: Armidale objectively measured ram sale catalogue - N.S.W. Australia.

stud to make valid assessment of the sheep offered. Table 6 is from the Forest Range sale catalogue and, although actual measurements are quoted the presentation does enable us to make valid comparisons between the rams on offer. Certainly more background information on the flock could be a help to a novice buyer. We have considerably more difficulty producing valid data in the National Merino Ram Sale because of widely varying ages of rams, rearing environments and age testing. Comparisons can really only be made between rams on offer by the one vendor in this case.

This brings me to the difficulty of making "between flock" comparisons. Wether trials are the best means we

Table 6. Forest Range ram sale catalogue

Number	Clean Fleece Wt. (kg)	Fibre Diam. (mic.)	Yield %	Body Wt. (kg)	Pur-chaser	Price
Lot 26						
15	2.7	18.5	75	50		
	2.6	18.5	70	48		
	2.7	18.5	75	43		
310	2.7	18.5	77	50		
Lot 27						
236	2.5	18.5	74	53		
385	2.5	18.5	79	46		
599	2.5	18.5	74	43		
Lot 28						
123	1.7	18.5	70	48		
299	1.7	18.5	65	44		
549	1.6	18.5	62	43		
634	1.7	18.5	65	39		
Lot 29						
203	2.4	18.5	72	44		
277	2.4	18.5	74	44		
340	2.4	18.5	73	44		

have in N.Z. at the moment but these were not designed for this purpose and therefore have limitations. I would suggest the establishment of a reference flock for the N.Z. Merino industry is a matter of great importance.

A reference flock is a closed breeding unit that is maintained in a genetically stable state by random mating i.e., the performance of the flock will not improve or get worse. Rams from such a flock can then be used by the industry in progeny tests to determine genetic differences between flocks and also, over a period of years, genetic progress within an individual flock. Reference flocks exist in South Africa and I believe one is to be

established in Australia. They needn't be large and little money would be required.

I am particularly concerned about the hawking around N.Z. of unproven, even untried, Merino ram semen. There almost seems to be the implication that semen in a tube or pellet is automatically better than semen on four legs. As far as Australian semen is concerned, the few of us that have knowledge of Australian studs and experience with their rams can probably make reasonable judgements as to their various sires' worth in N.Z. But the vast majority who do not have that advantage are provided with very little "real" information. One ram can have a tremendously widespread influence through artificial insemination and it seems the least we should expect is a bit more information about the donor sire than we provide for 15 month old flock rams.

Providing we can keep the rabbits at bay and the quality feed growing, then much of the future increase in fine wool income will depend on genetic improvement of our sheep. We have some very useful techniques to help us in this improvement available now, and some very exciting developments in the pipeline. However, the use of these techniques is not an end in itself. Success in genetic improvement will depend on the collection of accurate data compared on a valid basis and used in well planned, cost-effective breeding programmes.

Problem management on the farm

Mr Jon Newson*

Over the last three years we have been witnessing a revolution. This revolution has heralded an unprecedented shift of wealth around in our community. The shift of wealth that has occurred has created an enormous wave of problems that fertiliser or weed spray won't fix.

Like King Canut, many farmers have not much option but accept that they themselves can have very little influence on what is sweeping up to them.

- Interest rates are at crippling levels, and even the free market politicians have deemed it important to move in to make sure those rates don't drop too quickly. It would be a real shame to see a money lender loose his shirt, wouldn't it?

- Farmers have been lured into the attractive incentives to develop, stock up and expand. It was nice to gear up your equity with reasonably priced money, and now it is an absolute disaster to see the plummeting land price erode (sometimes) all equity. Many cost plus benefactors of SMP's have still only to hand on their costs, so they are all right.

- Many farming families, particularly those in the hill and high country, live and work in rather inaccessible locations, so I guess it is just hard luck that the costs of their services and schooling, heavily impacted by almost a decade of extreme internal inflation, now have to stand alone in the "restructured" economy.

* Registered farm management consultant, Otautau.

The three points outlined above reflect the very serious changes that have occurred in the farming community. These changes have for many developed into major problems, and it is the management of these problems that I would like to consider further.

The business I operate is centered in Otautau. This small rural servicing village is surrounded by fertile soil, a very good grass growing climate, and very efficient farmers. About two-thirds of my clients are involved with hill country - some with high country, and the remainder with more intensive farms. A clear trend in management practice exists. All groups are trying to emulate the feats of Waikato dairy farmers who led the change into better and cost-efficient ways to turn grass into saleable animal product. Some examples I use may directly relate to smaller sized farms, but I can assure you that hill and high country farms are only a proportionate representation of the same.

When I arrived in Otautau 21 years ago with my brand new Lincoln qualification, I was to slip into this small farm servicing community to do my bit as an advisor to a Farm Improvement Club comprising 35 farmer members. I had always wanted to be a farmer, and I felt that the advisory role would be the next best thing. I can recall thinking "oh to be a farmer on 350 acres of the good soil a few miles out from the village." I would, as they did, literally lead the life of Reilly. They were good days. Those farmers were affluent and they developed lifestyles to match.

A recent period of crazy inflation, and the previous approach of supports and handouts to be followed by a complete reversal, has devastated many families. It's like the rug being pulled out from underneath, and the feeling is less than pleasant. Our model 350 acres unit is utterly struggling. It is now more or less a part-time unit capable of producing a gross income, before any direct costs, not much different than the gross salaries of a senior school teacher whose wife is a nurse. What was regarded as a full-time economic Southland sheep farm

just a few years ago will now only produce a gross income similar to what the State pays a pair of middle order Public Servants. Putting on the valuer's hat we can inspect some of these good farms and apply a value of about one-third of the cost to the improvements. The corporate whizz kids from the cities could buy whole farming districts for what they are prepared to pay for prestigious urban locations. Things have turned a somersault. An enormous shift of wealth has occurred.

This example of the impact of present trends on what was considered the model economic family farm has devastated many families. Hill and high country farmers, because of the scale of operations, have a little more room to manoeuvre in than the small more intensive farm. The major problem I find in our local farming community is the failure to realise just what has happened. Yesterday we had subsidised Rural Bank money costing 11 percent, and a tax rate that bit in at 66 percent for an income in the mid $30,000s. Today we have that same Rural Bank money costing 23 percent, and opportunities for the family to organise their incomes to a 30 percent maximum tax rate. Yesterday's low interest and high tax was a recipe to spend, while today's doubling of the interest and halving of the tax is a recipe to save. Now that takes a bit of coping with if you are a farmer who has enjoyed the past 20 years of action and progress. All that development - the cheap money - the tax losses -more subdivision - more fences - more fertiliser -covered yards - new water supplies - better access. Those days of "all go" have turned into days of "all wo", and those farmers who have not changed gear are sliding off the road.

Assisting farmers to manage this major problem of economic change is most challenging. Many just refuse to believe what has happened. Some remain so blinkered and bigoted that they believe a favourable election night result will see an immediate return to the good old days. Some have turned to grog, others to religion. Most, I am happy to say, are looking straight down the barrel and seeking a new direction to aim at.

The important request I get from farmers is a statement of their position in a relative sense. They want to know how they compare with those around them. They want a factual appraisal of their own situation.

Stress is today's "in" word. Lots of meetings have been held up and down the country, and many papers written analysing this new phenomenon of stress. The economic revolution that has destroyed much rural wealth, coupled with the loss of national status of farmers has combined to provide a feeling of helplessness, and has lead to the upsurge of stressful situations. These changes have provided a very ripe environment for all sorts of support services to flourish. I have concluded that the majority of farmer problems that I have encountered require much more than the caring ear of a well meaning social worker, or a cup of tea and a hot scone with a chit chat at a support group - they require hard facts followed by motivation and direction. To lay the foundation for a successful solution, the farmer himself must initiate the meeting. He will be no doubt pressured by his provider of working capital - the Bank or the Stock Firm. If they write or phone with the request for me to visit their client, I invariably respond by asking them to tell the farmer to phone so that we can make a mutually suitable appointment. I feel that an approach from that direction avoids me entering hostile territory. You can bet that when the farmer phones he avoids relaying the impression that he is in any sort of trouble.

The farm visit would begin with a relaxing chat across the kitchen table that is designed to gain a historical sketch of the farmer's background, and the present family situation. It is good if the spouse is present and party to the discussion. At the same time, I will be flicking through the last three years sets of accounts to find trends that will be helpful. I would be making notes of the annual balances of current assets and current liabilities, and movements of long-term debts, and observing expenditure items, motor expenses and repairs and maintenance in particular. At this stage I make no comment on what I am recording, rather it is concentra-

tion on building up a clear historical picture. After a half hour or so, you can guarantee the farmer will have related his version of the cause of any problem, and revealed his perception of the relative importance of that problem. Some don't think that they have a problem, and most will blame someone else. It might be the Accountant because they had to pay a bit of tax three years ago, the Stock Firm because the drafter wouldn't get lambs away when they were ready, or the Banker because he is killing them with interest rates.

The next big phase is a quick look around the property. It doesn't matter how big or what the scale of the operation is, that hour or two tour is most essential to help weigh up problems. I try not to be critical and just observe. The property tour gives the opportunity to discuss the day to day management plan and the effect it is having on the look of the stock. Careful questioning will also reveal any prejudices the farmer has about farming systems, stock breeds, and maintenance inputs. Careful note would be made of the range of plant and its state of health, the level of subdivision, the backlog, if any, of maintenance, and the general state of tidiness of the property.

The return to the kitchen would commence with a quick summary of output. A quick sort through the stock sale sheets and wool notes will provide a very clear picture of the actual performance being achieved from the stock. Not many farmers would move a vote of thanks for GST, but at least that system has smartened up the on-farm filing systems, so the output recording can be completed quite quickly. The next job would be to complete a partial budget. By picking up the exact present cash position, and adjusting for income still to come till 30th June, and expenses over the same period, an accurate account of the liquidity can be made, and compared with the previous year's trends. Care has to be taken with the calculation to include all accounts on hand, any long-standing debt that has been incurred and not squared up, and any debt servicing arrears that exist. Some farmers like to pretend that some debts don't exist!

Next I would calculate the farmer's net worth, then table out how the total indebtedness has moved over the past three years. This shows clearly if he has been living off farm income or his capital. In past years it didn't matter so much if you were living off capital, because the value of the farm was climbing rapidly, and each year net worth would be improving overall. With the collapse in farm values, and the prospect of little gain in the near future, this is an important area to concentrate on and to ensure that the farmer and spouse have a very clear picture of what really has been going on with their business over that period.

The next period of discussion would focus on farm output. Gross income per stock unit is a particularly sensitive measurement because it irons out differences in farming programmes. If he doesn't like Coopworths because they are too fine in the bone yet his dumpy little wool-blind Romneys are only grossing him $30 per stock unit, discussion can then centre on how he could improve his production to achieve a more than acceptable $40 per stock unit level of gross at the same stocking rate. That index suits a Southland hill country farmer and is just as sensitive a measure for a Canterbury or Marlborough high country property. Almost always farmers with problems have low performing stock and have unjustified prejudices against some of the systems that will bring the improvements required. One can liken the gross income produced to a cake that has been baked. Slices totalling 50 percent can be spent on farm running expenses, and the rest of the slices can be spread between debt servicing and living expenses. Today it seems if much more than 35 percent of that gross goes in debt servicing, the farmer will have a problem.

What I am attempting to do is to involve the farmer and his spouse in a discussion about the facts of the business. The farmers always want to know how they figure in a relative sense to other farmers on like properties. Farmers are notorious at having each other on, and a farmer who is in financial strife is in great danger of having his confidence in himself upset by listening to half

truths from his friends and neighbours. I would be endeavouring to point out, as accurately as I could, just how his performance rates for his class of country, and would leave a check list of management changes that should improve output. I would be trying to motivate him to accept and make the changes required, and involving his wife in the discussion to ensure that she fully understands the situation and the need for any changes. If both the husband and wife can gain clear ideas of what lies ahead the battle is half won. Some wives who were reared in city surroundings thought that they had married a wealthy cocky, and often that was the case up until three or four years ago! It is very difficult for them to adjust. I cannot place a too heavy emphasis on ensuring, if at all possible, that all family members realise just as clearly as possible just what the position is. This is really the most difficult job, and has to be handled with great care given the owner's reaction to the problems. It's sad to have a broken marriage as well as unhappy kids if all that is required is a little more understanding of the relative importance of the problem.

Usually any problem that a farmer has relates to his finances. He is either spending too much or producing too little. I favour concentrating on ways to improve output rather than nit pick at his expenses. Improving output by $5 per stock unit of gross income through basic management change is a positive reaction to a problem, rather than suggesting he should resign from the golf club because the sub is too dear, and the car running costs too high.

Farming is an art more than a science. There are so many different ways of arriving at the same answer. Farmers' abilities and emphasis differ widely, and all I am interested in is output at the end of the day, and I will try to organise a list of suggestions that have a good chance of succeeding for a particular individual. It distresses me to find a farmer who has lost his motivation or direction. Sitting inside watching TV thinking things will come right is certainly not a

successful reaction to a farming problem. To motivate and generate enthusiasm towards basic change can bring success. This individual nature of farming has, as an addition, usually a deep sense of pride and a reluctance to discuss problems with other persons. Sadly many current account financiers wait too long before they blow the whistle. It must be very hard for them to judge a farmer's true situation from the warmth of their town office, and often they are not too keen to dig into the problem for fear of damaging a long-standing friendship or association. While social workers, ministers and the like have a valuable support role to play in managing problems, I am certain the real gains can only be made when the farmer accepts the need for basic management changes, and can strike up a relationship with someone he has confidence in to assist him in formulating the changes.

Often as not no new skills would be required to make the changes necessary. In Southland we would be concentrated on all-grass farming systems that need a motorbike and lots of reels of livestrand to be successful. We would be going for bodyweight and high per head production. The farmer only has to hone up many skills he already possesses. It is sometimes very good to manoeuvre the dollars around to produce a few for off-farm investment. It doesn't have to be a great amount, but it would provide a new learning curve that would create interest and a feeling of greater security. The farm systems today are easy and reliable. It's really good if a husband and wife can work together, not only on the farm but also with the recording and bookkeeping. Together they would be moving in the same direction with the same knowledge. It is important that children are aware of financial constraints, and that they are also encouraged to lend a hand. If some off-farm work was available nearby considerations should be given to taking it. Not only would it add a few more dollars to the income, it would also add an interesting new perspective. Such work should not compromise the success of the revitalised farm plan.

Frankly, many farmers don't realise just how well off they are, and it is nice to point this out to them. Certainly they haven't got the money to spend as in former times, but living on a farm and spending $10,000 per year on personal drawings creates a lifestyle of a town dweller on about $30,000 salary. If that suggestion is greeted with disbelief, then a calculation that accounts for car running, value of the residence, and taxation would put minds at rest. Being "well-off" is after all only a relative state of mind, and I for one would sooner be poor and happy than be rich and sad.

In conclusion, I would like to reiterate the thought that the most important aspect of problem management is to thoroughly identify just what is the problem and the extent of it. If the case is hopeless the calculations should speak for themselves, and the farmer can draw his own conclusions. Many farmers could well enjoy the challenges of a new life in a new environment, without the constant financial battles and the lifestyle of a peasant. I would never tell anyone they should sell up - they could just as well win a lottery the next day and all would be solved. I believe my role should be in presenting a factual analysis of the position and trends, then setting out the list of management changes likely to succeed and reward. I have tried to direct my remarks to farmers -between the lowlands, the hills and the highlands the only difference I detect is one of scale. Problems and management methods remain the same. Most of all is the need to provide confidence and the motivation to make the changes required. Like farm management, problem management is also an art.

Problem management on the farm — Commentary

Mr John Dugdale *

I would like to thank Jon for his presentation and the clear way in which he has outlined the problems as he sees them.

There was a phrase at the end of his paper which seems a key one: "The most important aspect of problem management is to thoroughly identify what the problem is." In addressing the question Jon has clearly looked at the facts and figures, and given some excellent principles on how to evaluate the situation with regards to the dollars and cents, and the kilograms of production. In commenting on his paper, I have no intentions of being critical of his problem solving or solutions. I do however wonder if his problem assessment has been wide enough. In evaluating any problem it is important that we distinguish between the symptoms, and the cause.

Let us consider an example by way of analogy. Suppose I have a tractor that won't start. Is the problem that my tractor won't start, or is the problem that there is not enough power coming from the battery to turn it fast enough? If, believing I have diagnosed it correctly, I hook up some jumper leads and pour extra electricity in, that should solve the problem. If the tractor still fails to start, it is predictable I may respond with some frustration. In some southern parts of New Zealand the extreme cold can cause diesel fuel to become jelly-like and cease to flow. Is the problem the cold weather?

Effective problem solving involves understanding the

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necessary and sufficient conditions to bring about change. No matter how much fuel we pour into the tractor tank, or electricity into the battery, the motor will not start until the fuel is able to flow. In like manner, if our clients are not responding to the increased facts and figures and information we are giving them, then that becomes a clue that perhaps we have not fully understood the problem. When people do not respond to sensible information, the question I keep asking myself is "why is he or she reacting this way?" Why do some people not take the good advice of their advisors? Why do some people not follow a logical course to a logical solution? Why do some people fail to respond at all?

I believe that if people do not respond to sensible and clearly presented facts and figures, it is because something gets in their way and stops them from attending to these facts. What gets in the way I believe is their feelings about what is happening. I really warmed to Jon's suggestion that it is important for an advisor to talk with the farmer and his family in an attempt to assist them to understand what is happening. I would have liked him to have gone further to try to understand the sort of feelings that may get in the way of people taking logical steps to solve or limit the problems they are facing. The sort of feelings like anger and sadness and anxiety, that get in the way of acknowledging the facts or reality of the situation.

In dealing with clients it is often helpful to think of the emotions as a mountain which can obscure our ability to see solutions. It is only when we are able to see over the mountain of feelings that we can actually start to come to grips with the nuts and bolts of the problem and then progress to a solution. Where this situation exists, putting more facts and figures in, is like pouring more fuel into the tank when it is the lines that are clogged. If we do not acknowledge and allow expression of the feelings then it is difficult for people to see beyond their immediate sense of pain, toward practical solutions and find the motivation to move ahead again.

In being an effective helper it is necessary that we understand why the client is reacting the way he is. Why is the farmer sitting inside, and not actively and practically grappling with the problems? Once we understand, we can begin to be more effective in assisting him find his own solutions and develop his own motivation.

Jon implied that stress in farming is a new phenomena for all. Perhaps the label of "stress" is new, but the situation is not new. History has shown that rural people have a remarkable ability to adapt and overcome difficult times. I would recommend a book by A. Tremenhere Yorke entitled "The Animals Came First" as a powerful commentary on how some of the rural people coped and adjusted to the major changes during the depression of the 1930s. Such a book is helpful, enabling us to see the example of the way in which people can face up to a difficult situation, deal with their feelings, and develop from that.

When I look at the rural situation over the last two years, I often ponder the question as to why people have been reacting the way they are. The framework I find most useful is to see them as facing a loss and therefore grieving. The whole range of grieving feelings are quite normal but need opportunity for expression. The question is how to help people with that. It is not helpful to professionalise all the problems, but rather help each community to tap into their own caring resources. At times it is very important to have some factual input and some clear analysis of the technical aspects, and Jon provided an interesting perspective on that. I want to underline the need to deal with the emotional aspects of where people are at any particular time. If someone is so caught up in their own feelings that they are not able to hear the factual, then the problem is not solved.

The most important aspect of problem management is to thoroughly identify what the problem is. To be helpful we need to understand more than just the factual figures. We need to understand the hopes, aspirations, and feelings

our clients have about their current situation. When we understand what it is like for them to grapple with the loss of income, of hopes, and of dreams then we may understand why our clients are reacting as they are, and be more able to encourage appropriate change.

Reference

Tremenhere Yorke, A. The Animals Came First: Farming in New Zealand during the depression of the thirties. Heinemann, N.Z. 1980.

Sensible strategic topdressing

Mr J. Kelly*
Mr J. Bates**

Introduction

In recent years fertiliser and debt servicing have been the two major costs in pastoral farming. As we know only too well, the debt servicing bill has increased substantially and the fertiliser bill has decreased substantially in the last two or three years. The reasons for this are well known and require no elaboration.

However, many hill and high country properties are reaching a stage where major decisions have to be made. Large areas of tussock land were developed under the LDEL scheme. In Otago for example, just under 200,000 hectares of tussock country were developed under LDEL in the early to mid 1980s. The bulk of this development was on land that had no history of topdressing. Because of the economics of pastoral farming at present, large areas have not received follow-up fertiliser. As a consequence the following four things could happen.

- Unless the blocks received above average fertiliser applications under LDEL or in subsequent years, pasture decline will be rapid. On well-developed and high fertility areas this decline may not show for two or three years. This would be typical of downland situations.

- Rapid fertility decline and yield decrease is related to soil test values. In general terms the newly developed

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pasture is more sensitive to this decline than pasture that has been developed for many years. This is particularly so in relation to sulphur in high country areas. Therefore soil tests are vital to determine one's position on the "slippery slope".

- The drop in pasture productivity is usually sulphur-driven because sulphur is washed and leached more quickly from soils than is phosphate.

- If fertiliser is not applied then pasture production will decline to a level approaching the original tussock cover and will reach an equilibrium at some stage at this lower level. Stocking rates will have to be adjusted accordingly.

The situation we face at present, is that many high country landowners are in a quandary as to what to do in relation to fertiliser applications. To add to this quandary we have recently seen the introduction of new fertilisers to the market.

Action required

This quandary can be overcome. There is only one way determine where to topdress, what fertilisers to apply and the rate of application. This is to map accurately the fertility status of the property. Altitude, aspect and soil type may vary greatly within one property and these factors must be taken into account when determining a fertiliser programme. However, soil testing is only part of sensible strategic topdressing.

In order to get sufficient information on which to base confident fertiliser advice we are currently recommending that between 20 and 30 samples are necessary on most hill and high country properties. The aim is to get a complete fertility picture of the property, and make recommendations accordingly.

With this accurate background information the fertilising policies can be confidently changed or amended according

to financial situations, environmental changes and for new fertiliser products that are coming onto the market. The absolute key to this advice is in the Consultant's skill in the interpretation and analysis of the soil test results and marrying these into the whole farm operation.

There is no question in our minds that soil testing and fertility mapping have been undertaken too lightly in the past, and that in today's economic climate a whole new ball game exists. The days have gone when properties were spending $40,000 to $60,000 and more on fertiliser based on the results of soil tests costing $50. A much more intensive and professional approach is required to really sort out the exact fertility position for each property.

Farmer input

You will all have heard of MAF's Computerised Fertiliser Advisory Service (CFAS) system that reports on the analysis of your soils. It can only give results as good as the information supplied. Part of this information is accurate past fertiliser and grazing records.

Within the CFAS scheme, one of the things it can do is relate fertiliser applications to carrying capacity. Whilst this is quite straightforward on intensive flat land, it can be extremely difficult in high country areas. In fact, one of the key factors determining fertiliser requirement is block (paddock) carrying capabilities. It is somewhat surprising that many grazing management records are not good. There are also some surprising results that have emerged from grazing management records we have analysed recently. Blocks which were thought to have high carrying capacities, and have received regular applications of fertiliser have been shown on analysis to have low carrying capacities. Conversely, blocks thought to have low carrying capacity have in fact had high carrying capacities. These figures are obtained from grazing records and, because it is crucial information in helping with the fertility mapping and monitoring of the property, we would recommend that grazing management charts be

kept. These can be relatively straightforward and basically involve recording the number of days, and the number and class of stock in various blocks. The summary gives a "birdseye" view of overall property management. They are an excellent aid in helping develop a fertiliser strategy. We are currently developing a computerised system for Otago high country farmers which will be able to rapidly convert the notebook details into a grazing management chart. It will also have the ability to model changes in the farming operation and hence will be a valuable tool to answer many "what if" type questions.

Improved stock performance can be obtained through improved grazing systems. This can be achieved with the aid of grazing management charts in matching fertiliser requirements with the real stocking rate. They are also invaluable for doing modelling exercises in terms of trying to adjust the grazing pattern particularly in relation to the critical late autumn or early spring feed supply.

Catchment Board run plan maps are a valuable aid in fertility mapping. These are extremely useful in helping to decide which areas to sample in terms of aspect, altitude, contour etc. They are also valuable when grouping areas for similar fertiliser treatments. I am sure you could all quote examples of having adjoining blocks receiving quite different and therefore impractical (in terms of application) fertiliser recommendations in the past. The maps also provide a very good record from which to start recording the monitoring programme. Many properties now have these run plan maps. Make use of them for this purpose.

Monitoring

A crucial part of any good fertiliser programme is an annual monitoring programme.

With the initial intensive sampling of between 20 and 30 samples that we would recommend, it is a relatively simple task to set up an on-going fertility monitoring

programme. This involves selecting maybe up to five or six blocks which are tested each year to check on the fertility status of the property. This keeps the farmer right up to date as to whether or not changes to the original fertiliser programme are required. It also continues to build up information for the fertility mapping part of the property. It also allows rapid and accurate adjustments to be made with changing financial situations. Adjustments can also be made for new fertilisers or price changes.

New fertilisers

Recently we have seen an increase in the types and forms of fertilisers available. These are in the phosphate and sulphur fertilisers in particular. Well-known ones at this stage are the reactive phosphate rocks and partially acidulated phosphate rocks. These are available through fertiliser companies and stock and station agencies. They appear to have slightly differing properties depending on their source and degree of acidulation, which affects the phosphate availability.

Because the effectiveness of rock phosphate fertilisers is so dependent on pH, temperature and moisture it is essential that expert interpretation is obtained before applying these new fertiliser types. This interpretation means relating both soil test results to the fertility levels and temperature and moisture on a particular property. The longer term effects of slower phosphate release must also be calculated. In Central Otago, consultants have identified areas where rock phosphate fertilisers can be used effectively. Because of the price advantages, savings of between $10,000 and $15,000 have been calculated. Other elements, particularly sulphur, must be borne in mind. In many high country situations sulphur is the major nutrient required. Because rock phosphates contain no sulphur, sulphur fertilisers must be applied as well as the rock phosphates. Various new types of sulphur fertiliser are also becoming available.

Example

As a very generalised example of fertiliser applications for many areas of Central Otago the requirement for phosphate is in the order of 0.8 to 1 kg phosphate per stock unit, with the sulphur requirements being in the order of 1.8 kg sulphur per stock unit.

In general, there have been good levels of phosphate application in the past and hence phosphate levels are good. In contrast to this, sulphur levels are generally low in many areas; the result of both low rates and infrequent sulphur applications (commonly every four years).

If we take a very simplified case of a carrying capacity of three SU/ha the 3-year requirement is in the order of nine kg phosphate and 16 kg sulphur. This can be supplied by applying 150 kg/ha 18 percent sulphur super. At $300 per tonne this is around $45 per hectare applied. If the interpretation and analysis of the soil test results indicate that some of the newer fertiliser materials could be applied in this situation, then these materials could be applied for between $20 and $30 per hectare; obviously a substantial saving, but only if they are applied under the correct conditions. These conditions require expert interpretation.

Future

Fertiliser will continue to be a high cost input, but with correct soil testing and good analysis of the results fertiliser will be a profitable way to spend money. The whole aim of fertiliser applications is to put it where it is going to give the best result. If you like, strategic fertiliser applications. The whole basis of testing, interpretation and analysis is changing, in that to make the most effective use of the fertiliser dollar, soil test results must be tied into grazing management records. This gives a second-to-none ability to determine accurately fertiliser requirements now and in the future. This will no doubt show some areas that have received

fertiliser in the past but will probably never receive fertiliser again because the returns are too low.

The best decisions are based on the best advice. Many individuals and agencies can do soil testing for you. The question we would like to leave with you is: How many of these have the knowledge and expertise to give you a full and complete analysis and interpretation of the soil test results, and marry these in with grazing and other farm records to enable you to fertilise with confidence to maximise profitability?

We would also suggest that if your property is hill and high country and in excess of 1,000 hectares or 4,000 S.U. and someone tells you he can accurately give you the fertility status and fertiliser requirements of your property without doing a minimum of 10 to 20 tests (depending on contour, aspect, altitude, soil type and size of the property) then you should tell him to 'go jump in the lake' and employ someone who can give you the answers you need.

The time has arrived for all hill and high country farmers to give much closer attention to assessing and mapping the soil fertility profiles on their properties. Guesswork and luck, on a few soil samples are not good enough in today's economic climate.

For a fraction of your annual fertiliser bill you can have your whole property tested and documented with fertiliser recommendations outlined for the next three or four years. The regular monitoring programme will check these recommendations and adjustments can be made as necessary for fertility level, new fertilisers or changed financial situations.

Acknowledgements

To Dr Mike Floate and Dr Colin Boswell, Scientists, Invermay, for assistance in the preparation of this paper. To consultants in the MAF Hill and High Country Consultancy Service for information and commitment to the programme.

The fertiliser programme on Long acre

Mr P. Davis *

Long Acre, which my brother and I purchased in 1979, is situated 15 km north of Tarras on the Lindis Pass highway. The property of 3933 hectares is in two blocks two kilometres apart, and consists of 100 ha border dyked pasture, 100 ha dryland lucerne, 200 ha of flats and rolling country and 3500 ha of hill and high tussock country ranging in altitude from 500 m to 1500 m.

The Home block is 2500 ha and the Blue Cliffs block, 1450 ha. Rainfall varies between 500 mm in the west to 875 mm on the higher eastern country. As both blocks run east-west, about half the run is sunny country.

In 1979 Long Acre carried 5600 sheep and 120 cattle. Now we run 12000 Merino sheep and 450 Hereford and Hereford cross cattle. At that time 400 ha of the Home block front country and 800 ha of tussock had been topdressed.

We were fortunate to take over Long Acre when the Livestock Incentive and the Land Development Encouragement schemes were in full swing. With advice and encouragement from our stock firm manager, Mr Ian Scott, we applied for a loan from the Rural Bank to topdress and oversow 1800 ha, the majority of the tussock country on the Home block. We applied 190 kg/ha of 20 percent sulphur super in the autumn of 1980 and again in the spring with 2 kg/ha of white clover, 2 kg Alsike and 2 kg Cocksfoot. After a favourable season the results were fantastic; far better than we expected. A fencing

* Tarras, Central Otago

programme was quickly implemented. We had not realized the need for smaller blocks.(At that time the Home block was subdivided into six main blocks and Blue cliffs was one paddock. Now we have 19 and 10 main blocks respectively).

With the help of a LDEL for Blue Cliffs we applied 500 kg fertiliser per hectare and a seed mix similar to that applied on the Home block. This topdressing was very poorly done some parts of the area receiving over 1 tonne per hectare and much of it none. Unfortunately poor distribution does not show up immediately and all we could do was complain and change our aerial topdressing company.

Having covered the whole run (with the exception of land over 1200 m on the dark side of Blue Cliffs) the next task was to keep fertility levels up for we realized that if fertiliser is not kept up the clovers will become depleted and more undesirable grasses will take over; Browntop on the dark sides and Barley grass and Brome on the sunny ones; something we had noticed on other properties.

We divided the place roughly into four areas and intended to do one area each year. Soil tests were taken on the first area and showed plenty of phosphate but low sulphur, so we applied 125 kg/ha of 20 percent sulphur super (subsequent tests have shown this was not enough sulphur). Two other areas were similarly topdressed.

When we completed the third area (last year) we began to wonder if we were applying the correct fertiliser and applying it where it was most needed. High costs made us scratch our heads, as the last application cost in the vicinity of $300 per tonne.

To help solve our problem we were approached by two members of the MAF, John Bates and Dr Bruce Allen. (With the MAF now being a 'user pays' organisation some members are out looking for work. Hopefully they are just what we are looking for.)

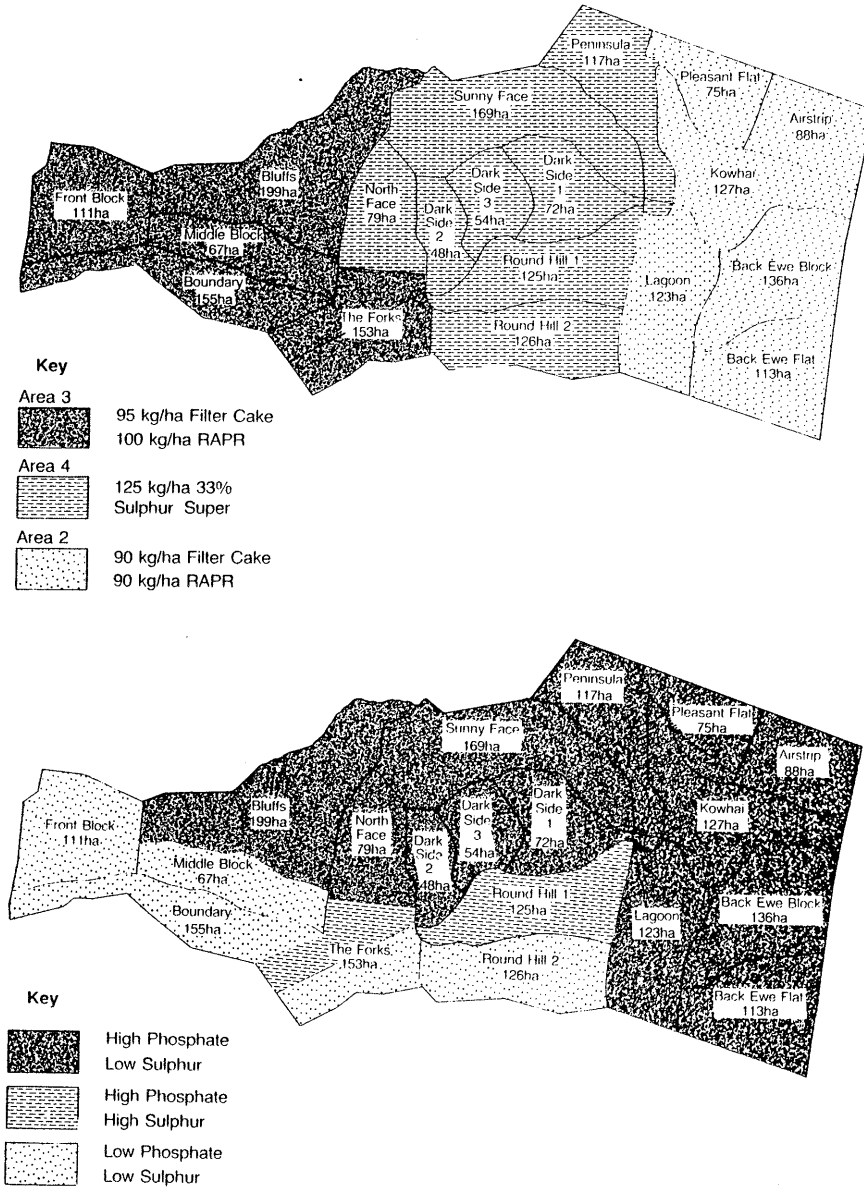
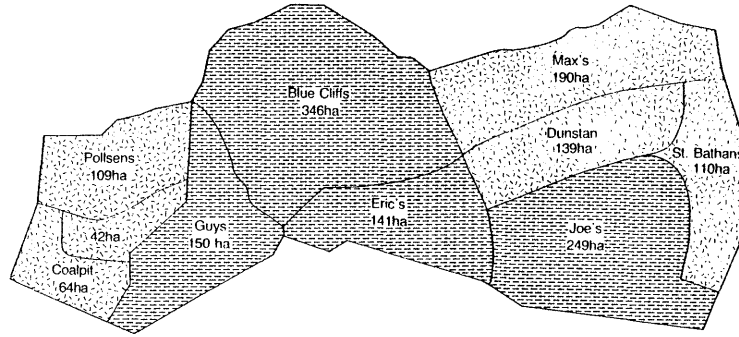


Figure 1. Fertility levels and fertiliser programme - Home Block



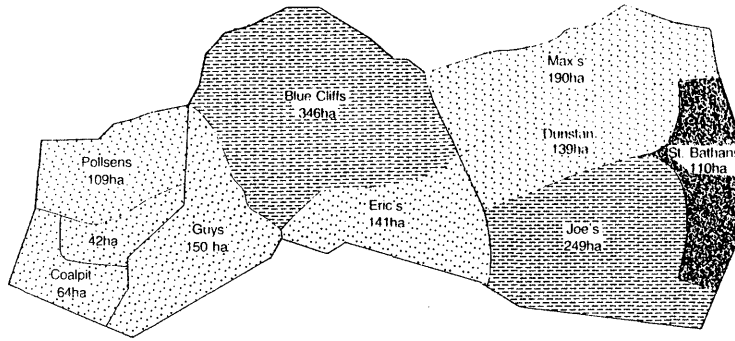
Key

Area 7

125 kg/ha 33% Sulphur Super

Area 1

85 kg/ha Filter Cake
85 kg/ha RPR



Key

High Phosphate
Low Sulphur

High Phosphate
High Sulphur

Low Phosphate
High Sulphur

Figure 2. Fertility levels and fertiliser programme - Blue Cliffs Block

During May, John Bates took soil tests over the whole property. We now have the results and his recommendations. He has split the place into eight fertilisable areas and again these will fit into a four year programme. It is not as simple as our plan but hopefully will produce better results.

Figure 1 shows the current fertility status of the Home block and fertiliser recommendations.

Figure 2 shows the position on Blue Cliffs block.

During the past seven years we have topdressed nearly the whole property three times by blanket coverage and introduced more productive grasses and clovers. As a result we have increased stock numbers considerably and controlled rabbits by changing their habitat. Smaller blocks have resulted in more feed and made management easier. Some weeds have increased (brier and matagouri) as has the cost of fertiliser and the tax bill. However, the drawbacks far outweigh the benefits.

In the future our strategic topdressing programme will:

- include concentrated fertilisers and thus reduce transport and flying costs

- make use of helicopters and trucks to ensure greater accuracy and better distribution

- be based on regular monitoring of fertility levels.

A more planned approach to fertiliser use is most important to achieve the best results.

The sustainability of pastoralism

Professor Kevin O'Connor*

The concept of pastoralism

Pastoralism has been a troublesome and ambiguous word. Clearly from the construction of the Land Act 1948, "pastoral use" referred to therein, did not include any kind of farming use. Pastoral farming, in which the land was farmed with fertilisers, fencing, and the like, was not part of pastoral use for which "pastoral land" was designated as suitable in that Act. Despite recurrent reminders of the anachronism of the 1948 Land Act through the last two or three decades, culminating in the explicit finding of the Clayton Committee on the subject, the Lands Settlement Board and officers of the Department of Lands and Survey have failed to attend to this mutual exclusion of these two terms. Allow me to make my distinction between them.

Pastoralism I have used to signify the pastoral use of unimproved vegetation as pasturage for sheep or cattle, managed extensively on grasslands, perhaps modified by burning, grazing, oversowing or by infiltration of adventive species, but not transformed by topdressing and intensive management.

Pastoral farming I have taken to include the use of pastures and supplementary feed for sheep, horses, goats, deer or cattle, managed semi-intensively or intensively on land developed by oversowing or by cultivation and sowing, with topdressing of fertilisers and increasing intensity of grazing management.

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The transformation of pastoralism into pastoral farming I have represented as "the pastoral development transition". Pastoralism I have considered as exploitative, in the sense that it sought to make use of an existing resource system without augmentation. Pastoral farming I have seen as something different, involving some resource development by accessing of other resources extrinsic to the system, such as fertilisers. Over the last 35 years I have worked to promote the displacement of pastoralism from most of our tussock grasslands. Many people, most especially pastoral runholders, have recognized the deep change in character of land use that was involved in the transition from being a grazier to a farmer. Many people have not recognized this character shift from one use to the other and have used the same word "pastoralism" for both. Some of them indeed have attempted to have land administration of the one carried out under the legal provisions for the other. In this is the source of much of our present difficulties and distress.

For these reasons therefore, I shall try to address the question of the sustainability of pastoralism as I have defined it, and also the question of the sustainability of pastoral farming as I have described it.

The concept of sustainability

What do we interpret as sustainable? We know that its every day meaning is "able to be kept up or kept going". As such, it has an economic as well as an ecologic connotation. Incidentally, the new Environment Act includes sustainability of resources as one of the concerns under the long title of that Act. It does not do us the favour of defining the concept used in this way. However, Hunt (1979) has clearly expounded the theme of "resources and technology sustainability" as a strategy for New Zealand in the future world. In ecology and its applications, this meaning of "able to be kept up", where the rate of renewal does not fall behind the rate of consumption, has been popularised as a desirable criterion of resource use. There is lack of consensus about conditions for applying it. For renewable resources like

forests and fisheries the concept works fairly well. For non-renewable or fund resources like coal and mineral ore there is difficulty. Among economists there is less enthusiasm for its validity as a criterion of use than among ecologists. Some economists and philosophers of technology even question its desirability.

Accordingly, "sustainability of a resource use" may be a better marker for our own individual attitudes to environment than it is a criterion for wise use itself. The range of our attitudes is illustrated in Figure 1. As we traverse the spectrum of such attitudes to the iridescent green of the "deep ecologists" from the hectic red of the "cornucopians", we should expect an increasing concern for ecologic sustainability. If you have no ancestral experience of technological history where a famine has given rise to a flood as a new technology unlocks new resources, if your view of the future is

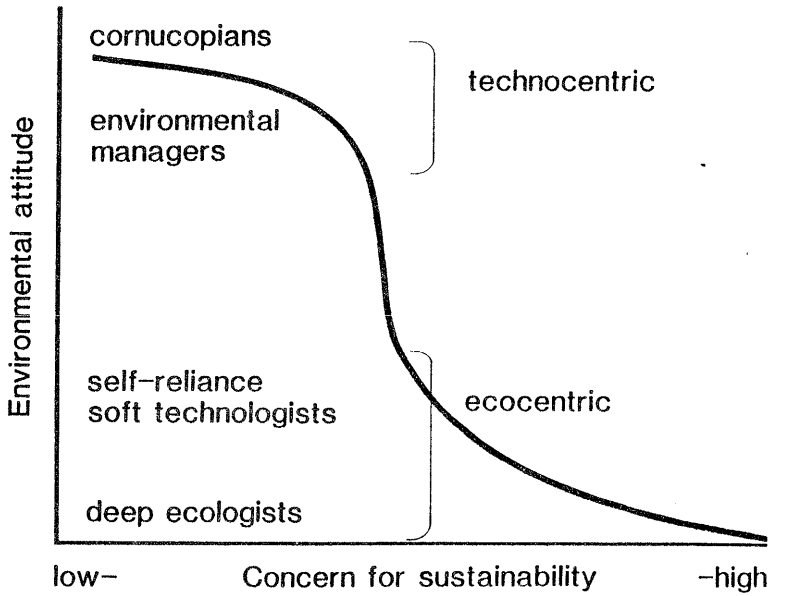

Figure 1. Relationship of concerns for sustainability with environmental attitudes, classified after O'Riordan (1976)

bounded by limits of earth, then you may tend to the concern for sustainability that characterises what O'Riordan has called the "deep ecologists". If in contrast, you lack any personal anxiety for the future or your descendants, if your view of future is dominated by human capacity for technology, then you may share the belief that something new will surely turn up and that resource sustainability is no concern of yours. On the one hand is ecocentrism, on the other technocentrism. Some people indeed belong to such extremes.

More likely, you will find yourself somewhere between the green and the red, close to the "forever amber" of the middle. I find for example, among our present students in courses for parks and recreation management and agricultural science, a strong inclination towards the zone of soft technology. I suspect that among commerce students there may be a balancing concentration on the other side of the centre. I would like it known that there is among our youth a healthy scepticism about the independent efficacy of law, market, science, or even of governmental good intentions. There is also some doubt among students about the sustainability of such "high-tech", especially "high-chem" or "high-energy" agriculture as has been nourished in New Zealand over recent decades. For students of all ages, the question of "alternative agricultures" is as much to the fore as is the sustainability of agriculture as we have developed it.

The quest for alternatives in agriculture is at the same time economic and ecologic. It is a contemporary version of the exploration of diversification opportunities of a decade ago. The vision of the sustainable includes the vision of adaptive variation. It is as important to the credit merchant as it is to the soil conservator. When we turn therefore, to the tussock grasslands and mountain lands, the emerging questions for a host of people of all ages and of a wide range of environmental persuasions are the sustainability of pastoral use in one form or other and the possibilities of alternative land uses.

Pastoralism without development - Earlier appraisal

I have recently completed (O'Connor, 1986) a review of the history of scientific influence on the use of tussock grasslands. That history is the story of a society's steadfast commitment to pastoralism, occasionally punctuated by scientists' doubts as to the wisdom of one pastoral practice or another. It is not a story of repeated examination of the sustainability of pastoralism. That question does not seem to have been seriously posed until comparatively recent times, about 1940s.

Let me mention the cursory assessment that I made of pastoral use of unimproved tussock grasslands at Lincoln College Farmers' Conference 27 years ago (O'Connor, 1960). I noted that the cream-skimming exploitation of earlier times had not worked too well in cold, high altitude zones, in zones of low or erratic rainfall, in zones of low soil fertility or in zones of high potential for scrub growth. Sadly there wasn't too much else. That was in 1960, the year that TGMLI was founded. Twenty-one years later in my valedictory as director (O'Connor, 1981), I continued to doubt the sustainability of exploitative pastoralism, not on the grounds of soil erosion induced or accelerated, but on the basis of the pastoral records and from the consensus interpretation of vegetation changes. In the interim there had been no persuasive evidence that pastoral use without pasture improvement could be any more widely sustained than I had assessed in 1960. For most of the high country, pastoralism without improvement had not seemed ecologically sustainable. Where it was sustainable it seemed economically marginal and unable to withstand competition from a higher use, pastoral farming with pasture improvement.

The historical record of pastoralism

Such were the postulates which I have recently sought to confirm or deny by the more careful examination of county agricultural and pastoral statistics, drawn from a wider area than the Vincent and Lake counties earlier examined (O'Connor, 1980). I have recently published (O'Connor, 1986)

sets of graphs of livestock numbers, pasture and feed areas for Maniototo, Vincent, Lake, Mackenzie, Strathallan and Waitaki counties for 100 years from 1880. In those graphs I partitioned livestock (as sheep equivalents) carried on range from livestock on feed, the latter estimated from the ever-increasing area in sown pastures and feed crops. I also calculated and graphed the estimated stock load on range as sheep equivalents per 100 hectares. The calculated values for this last statistic are summarised for the six counties in Table 1.

Marked declines in range stock load from 1881 to 1950 are shown for the driest counties, Vincent and Maniototo. However, somewhat similar relative declines are demonstrated elsewhere, especially for Strathallan and Waitaki. Most counties share in a recovery in range stock load over the last three decades, no doubt thanks to rabbit destruction and agronomic improvement of tussock lands.

Table 1. Calculated stock loads on range (sheep-equivalents per 100 ha) for 5-year periods from 1981 to 1980 for six South Island counties. For each county values relative to 100 for 1880-1885 are shown in parentheses

5-year period	Maniototo	Vincent	Lake	Mackenzie	Strathallan	Waitaki
1881-1885	113 (100)	75 (100)	36 (100)	62 (100)	64 (100)	96 (100)
1886-1890	111 (98)	67 (89)	27 (75)	65 (105)	67 (105)	67 (70)
1891-1895	98 (87)	62 (83)	29 (81)	65 (105)	79 (123)	61 (64)
1896-1900	85 (75)	46 (61)	26 (72)	49 (79)	58 (91)	59 (61)
1901-1905	72 (64)	40 (53)	26 (72)	53 (85)	55 (86)	61 (64)
1906-1910	67 (59)	42 (56)	33 (92)	58 (94)	50 (78)	53 (55)
1911-1915	66 (58)	41 (55)	39 (108)	55 (89)	35 (55)	56 (58)
1916-1920	59 (52)	36 (48)	41 (114)	56 (90)	42 (66)	58 (60)
1921-1925	72 (64)	37 (49)	41 (114)	53 (85)	28 (44)	64 (67)
1926-1930	84 (74)	43 (57)	48 (133)	62 (100)	36 (56)	71 (74)
1931-1935	75 (66)	48 (64)	51 (142)	63 (102)	36 (56)	75 (78)
1936-1940	58 (51)	45 (60)	47 (131)	61 (98)	34 (53)	72 (75)
1941-1945	44 (39)	44 (59)	44 (122)	62 (100)	22 (34)	58 (60)
1946-1950	17 (15)	30 (40)	34 (94)	54 (87)	18 (28)	35 (36)
1951-1955	7 (6)	25 (33)	39 (108)	55 (89)	41 (64)	34 (35)
1956-1960	25 (22)	39 (52)	49 (136)	66 (106)	75 (117)	91 (95)
1961-1965	23 (20)	47 (63)	49 (136)	72 (116)	77 (120)	68 (71)
1966-1970	35 (31)	63 (84)	55 (153)	90 (145)	112 (175)	60 (63)
1971-1975	60 (53)	61 (81)	49 (136)	88 (142)	111 (173)	106 (110)
1976-1980	87 (77)	31 (41)	43 (119)	81 (131)	122 (191)	138 (144)

Apparently the most sustained range stock load is shown by Mackenzie County. Despite these appearances of a sustained level of pastoral use, Mackenzie County can be used to illustrate the convergence of declining pastoral fortunes and vegetation changes. As I have demonstrated (O'Connor, 1986), Leonard Cockayne (1919) used evidence of sheep numbers in this county, (A.H. Cockayne 1916) to reinforce his own belief in the resilience and durability of low tussock grassland, without allowing for the increasing carrying capacity of sown pastures and feed crops. When such an allowance is made as here, Mackenzie County demonstrates an early decline, a surge in the Great Depression and an otherwise relatively stable livestock load on range. Despite this relative stock load constancy for the county as a whole, Mackenzie Basin runs in the humid north-western sector, in the sub-humid central sector, and the semi-arid south-eastern sector, collectively displayed a net 20 percent decline in sheep numbers over the first half of the present century (O'Connor, 1976). Apparently the county terrain outside the Basin increased in range stock load to compensate.

The vegetation changes that accompanied the initial surge and subsequent decline in range stock load were apparently not everywhere the same. Tall tussock was apparently dominant over most of Mackenzie County when Burke and Mackenzie found for themselves the passes known previously only to the Maori. Probably the only exceptions were the shallower outwash plains below the lake-enclosing moraines (Connor, 1964), and the lower sunny steeplands in the south-east. Scrub, speargrass and bluegrass (Elymus rectisetus) were characteristic of such drier country. Burning of drier zone vegetation reduced scrub and speargrass and temporarily increased grass availability to livestock. As early as the 1850s, Thomson (1859) had noted the sparse grass on the shallow stony soils of the south-east. From such a condition the vegetation progressively deteriorated to the present open weed communities. Short tussocks such as Festuca novaezelandiae and Poa cita may have been as much early increasers in a pastoral regime on such terrain as have later been sweet vernal and hawkweeds.

We may never know the true character of the pre-European vegetation of these drier terrains. What we know with more confidence is that these drier terrains were fully stocked with sheep ahead of the more humid country, probably reaching their maximum load by the early 1880s at the latest. Sheep numbers recovered after the general collapse of the great snow of 1895, declined and recovered by 1912, declined to a new low in the early 1920s and recovered again by 1929, before beginning a long slide to the early 1950s. We also know for this group of drier runs in the Upper Waitaki that both sheep and rabbits have thrived there despite depletion, and that labour employed, area of improvable land and proportion of it developed, rather than tonnage of fertiliser used, appear to explain most of current variation in run production (Bussieres, 1984).

On the more humid runs with deeper or moister soils where tall tussock initially dominated, livestock maximum numbers were reached later in the Colonial period. Sheep declines came later and their recoveries were less marked (O'Connor, 1976, 1978). What we can now discern is that the more humid runs have depended for their recent recovery in livestock numbers much more on agronomic development than on natural revegetation. This feature is later more explicitly discussed under the heading of sustainable pastoral farming development. What it suggests is some fresh insights into the nutritional character of the range deterioration that accompanied the pastoral use of tall tussock grasslands.

Nutritional dynamics in pastoralism

Repeated burning allowed the Chionochloas to be used as pasturage (Williams and Meurk, 1977). This also allowed nutrients to be lost from the soil-vegetation systems (McSweeney, 1983, Payton et al. 1986). As Connor (1964) and O'Connor and Powell (1963) have demonstrated, the pastoral aim of inducing short grasslands suitable for sheep was achieved by repeated fire and grazing of tall tussock. Fescue tussock grasslands have been the widespread result. The grass which later became known as fescue

tussock (Festuca novaezelandiae) was initially recognized, not as a tussock but as a valuable tufted grass (Buchanan, 1880). Years later we learned from field experiments (O'Connor, 1965, 1967) and from feeding trials (Dryden and Archie, 1980), that its feeding value was acutely dependent on its own nutritional regime. So we now observe that the better is its nutritional regime from topdressing, the more do sheep eat it and the more rapidly does it disappear from the oversown grasslands. From our recent research into the causes and mechanisms of these changes in acceptability and digestibility of fescue tussock it is now possible to reinterpret the past. It now seems that the poorer was the nutritional regime, the more sheep ignored this grass, the more tussocky did it become, and the more did we feel obliged to burn it!

We have had far too much argument about how much credit European man should take for causing or curing soil erosion. What is more important is to acknowledge that we starved topsoils from their natural nutrient replenishment by firing the vegetation so frequently. Even if soil organic matter was not directly burnt, organic matter levels would have been reduced by cutting off the return of plant material, promoting increased soil drying cycles and accelerating mineralisation. Evidence of such soil changes accompanying the conversion of tall tussock grasslands to short grasslands has been accruing from the experimental and survey work of Payton et al. (1986), McSweeney (1983) and McIntosh et al. (1981). We may not have been giving sufficient attention to the effects of such new nutrient effects in soils which had already lost their major organic cycling agents as forest trees some centuries before.

The translocation and transformation of key elements, N, S, and P through fire and grazing became the central processes of a new soil wasting regime of extensive pastoralism. With fire every three years, standing crops of nitrogen (60-150 kg ha^{-1}) and sulphur (10-15 kg ha^{-1}) (Williams et al. 1977) would have been lost in gas and smoke. The much smaller proportions of these nutrients consumed by animals would have been concentrated in urine

patches for subsequent loss by leaching or ammonia volatilisation. As review of nitrogen balances indicates for extensive grazing conditions (O'Connor, 1983a), livestock could be expected to have an aggregating and net negative effect on N balance. Orchiston at Lincoln College three decades ago calculated the substantial annual export of sulphur from New Zealand grasslands in the form of wool (Orchiston, 1957).

Phosphorus concentrated in the dung of stock camps would have readily entered the inorganic regime, like that in the ash of previous fires. Where soil conditions were conducive to P retention, we can now postulate a decrease in effective P availability as an outcome of these concentrated pulses of mineralisation. Strange as it may seem, the escape of phosphorus from the organic regime and its "fixation" in the inorganic regime may be the essence of the desertification process, occurring even in humid regions, but especially in soil-vegetation systems approaching some terminal steady state. Whereas on the drier lands we induced weed communities of annuals, prickly, smelly or both, we induced a new kind of poverty on the humid tussock lands themselves. It was what Williams et al. (1977) described as a "pseudo-aging", like getting worn out before one's time. It had first occurred with forest destruction.

There would have been some terrain exceptions on the humid runs to this soil aging and vegetation impoverishment. They would have been on the extensive recent soils of valley alluvium and on skeletal steepland soils. Their role is discussed in relation to the sustainability of pastoral farming.

Current assessment of sustainability of pastoralism

The current situation is one in which the ecological factors affecting the sustainability of pastoralism have altered little from 30 years ago, while the relevance of the question has dramatically changed. In summary, the land which is most capable of supporting pastoral use as unimproved grassland, is the land with sub-humid to

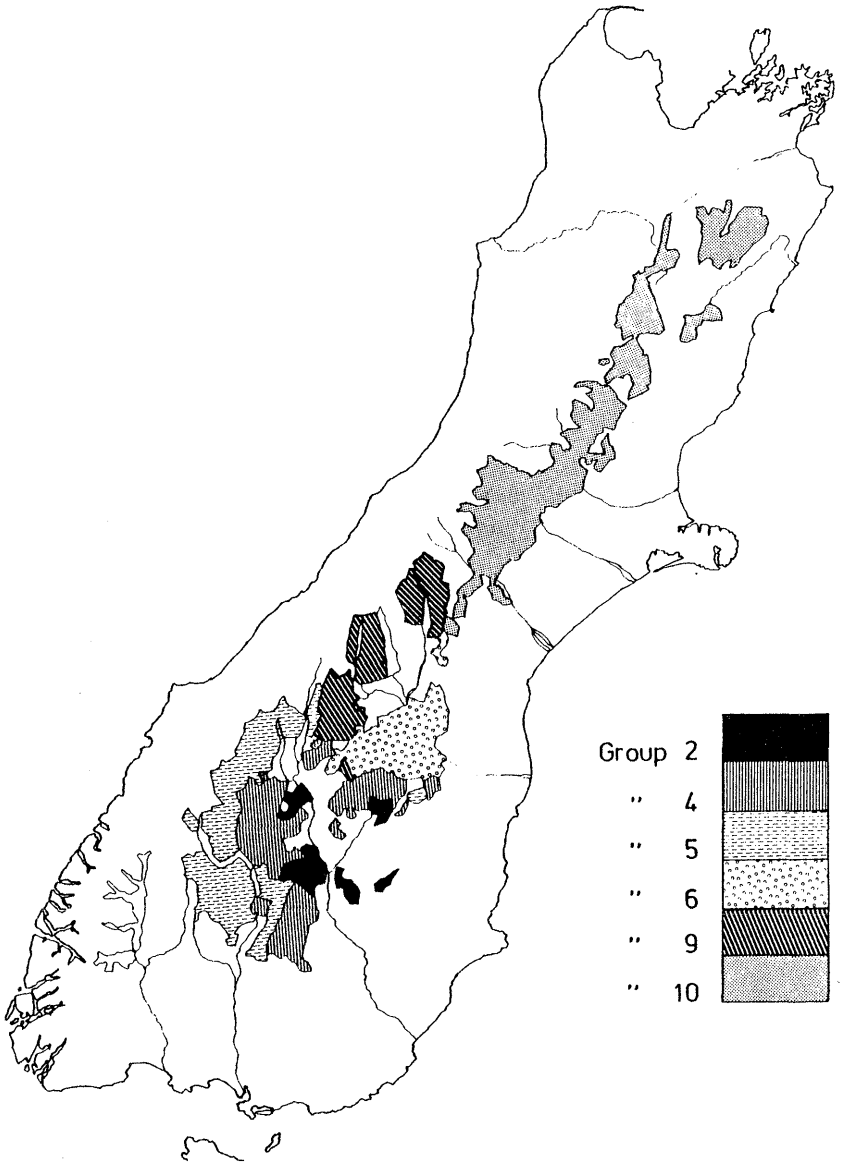

Figure 2. Distribution in South Island high country of six major groups of pastoral runs, classified according to their land resources (Bussieres, 1984)

semi-humid climate, not too steep, and of low to moderate altitude, with sulphur and some slight phosphorus deficiencies rather than grave phosphorus deficiencies. This same land has been readily and profitably developed with topdressing, more intensive fencing and livestock management. Let us examine how this competition for land has already altered the practical relevance of the sustainability of pastoralism. We shall see that it has been differently affected in different parts of the high country.

Bussieres (1984) classified runs according to their proportions of different soil-landform components. The six major groups of runs emerging from her clustering process are located as shown in Figure 2. Table 2 shows the number and mean area of runs in each group. It also shows the different areas of actual and potential development, mean proportion of total area developed by 1976/78 and mean proportion of total area which I have estimated from their soil-landform components to be readily developable. For both the semi-arid runs of Central Otago and the sub-humid runs of Otago-Southland, more than half the readily developable terrain had already been developed to some degree by 1976/78. The comparable proportion for all other major groups of runs, except the humid Waitaki group, was approximately 30 percent.

Table 2. Potential and actual development on runs of different groups

	Group location	No. runs	Mean area (ha)	% Readily developable	% Already developed 1976/78
#2	Semi-arid, Otago	21	7 495	30	17
#4	Subhumid, Otago-Southland	43	9 013	30	17
#5	Humid, Otago lakes	32	14 633	27	8
#6	Subhumid, Waitaki	23	9 430	34	10
#9	Humid, Waitaki	20	15 105	32	6
#10	Subhumid to humid Canty - Marlborough	56	13 668	20	6

This was the situation in 1976/78 when, as Kerr and Lefever (1984) revealed, the average proportion of high country runs already developed had reached 11 percent of total area occupied.

Relevance for Nature Conservation

In Table 3 I have attempted a series of summary estimates of the proportions of three important land uses on the readily-developable land of all high country runs. This area of land, some 870,000 ha in the lowland and montane zones, represents about one quarter of the total pastoral run area. It approximates to the area theoretically capable of sustaining pastoralism while in the unimproved state. By 1972 about 70 percent of this area remained undeveloped. By 1982 this opportunity in the unimproved condition for sustainable pastoralism and for nature conservation had already been reduced to little more than a third. Since 1982, considerable further new land development has occurred, although probably not as much as that for the previous five years. It has been pointed out frequently (Scott, 1980, O'Connor, 1982, Mark, 1982, 1985) that it is the low altitude grasslands and related native vegetations which are being most rapidly lost from nature conservation in the wake of pastoral farming development. Opportunities for nature conservation have been fast disappearing. For such reasons, the Clayton

Table 3. Estimated percentages of readily-developable lowland to montane land on high country runs in three uses 1952 to present

Use	1952 (est)	1972	1977	1982	1987 (est)
Pastoral use undeveloped	100	70	60	36	25
Developed for pastoral farming	<1	30	40	64	75
Dedicated for nature conservation	0	0	0	<1	<1
Estimated total area	870 000 ha				

Committee and Land Settlement Board had urged the identification of prospective areas for nature conservation purposes. For like reasons, moratoria were imposed by Land Settlement Board on permit-requiring developments of such lands, as they were identified.

Moratoria have proved irksome, as negotiation for the implementation of any kind of protected area status has remained minimal. What has been lost sight of in the ensuing tension is that the once characteristic "short tussock grasslands in good native condition", now become so rare, represent a diminishing cultural heritage of pastoralism as much as they represent a diminishing natural heritage. McSweeney (1986) and Ashdown and Lucas (1987) expounded the opportunity that remains for sustaining moderate pastoral use on short tussock grasslands dedicated or covenanted as protected natural areas. Prescriptions for such sustained moderate pastoral use with the exclusion of topdressing have frequently been recommended by the Protected Area Scientific Advisory Committee (PASAC). Sometimes that Committee has suggested provision of animal exclosures to allow the effects of sustained pastoral use to be monitored and interpreted. For tussock country where pastoralism seemed sustainable, it has also seemed that pastoralism and nature conservation were compatible. With both of them however, pastoral farming evelopment has emerged as intensely competitive. With no positive intervention, pastoral farming development seems destined to occupy all of the land to which it is highly suited.

In contrast with the compatibility of sustained pastoralism and nature conservation on such lower altitude terrain, opportunities for nature conservation at higher altitudes have generally explicitly or implicitly involved the cessation of pastoral use. In many such cases, pastoral use has already ceased.

As expounded above, at lower altitudes pastoral farming development is competitive rather than complementary with nature conservation on the same parcel of land. Pastoral farming development, however, may be often needed as a

companion use alongside protected natural areas, in order to prevent their invasion by wildfire or wilding conifers. (O'Connor 1983, 1986a).

Pastoral farming development - Zonal differences

Why pastoral farming development has proceeded at the expense of pastoral use of unimproved land in the lowland-montane zone is a matter of economics. Its comparative economic advantage over a traditional pastoral system has been demonstrated in a number of studies e.g. Mars (1972), Whitby (1979). Most of all, however, its rationality is demonstrated by the substantial increases in livestock carried per hectare on developed land in comparison with undeveloped land of the same kind of soil. Table 4 presents a comparison of livestock carried on topdressed and untopdressed blocks surveyed in 1978 on 56 runs from North Canterbury to Central Otago. As has been shown in the Waitaki (O'Connor et al. 1982), some of this improved performance with topdressing is attributable to the greater subdivision on improved grasslands. In the present comparison, the influence of development by topdressing is examined on land of different zonal soil groups. For this reason I have included only blocks of land which are identified from soil maps as each belonging to but one soil set. Two features deserve attention. First, in the untopdressed condition there is a general decline in livestock load with increase in moisture from the zonal soils of semi-arid and sub-humid country to the zonal soils of the humid runs, the hygrous high country yellow-brown earths. Second, this trend is no longer demonstrated in the topdressed condition. Whereas the mean livestock loads as stock unit months per hectare are three times higher with topdressing at the drier end of the scale, they are about eight times higher with topdressing at the wetter end of the scale.

This suggests substantial differences between different groups of runs in the significance of soil resources such as flood plains and youthful fans, as well as in other factors affecting the economics of development. This is

supported by the contrasting features of the two groups of runs of the Upper Waitaki, Group 6 (sub-humid) and Group 9 (humid) which are presented in Table 5. Data for this table, like those of Figure 2, are drawn from Bussieres (1984).

Table 4. Mean livestock load (s.u. months ha^{-1}) on untopdressed and topdressed blocks classified by genetic soil groups

	Untopdressed		Topdressed	
	n	$\bar{x}$	n	$\bar{x}$
Subxerous BGE's	4	13.6	13	38.1
Dry subhygrous YGE's	39	11.1	54	34.6
Dry hygrous YGE's	13	6.6	14	34.3
Hygrous lowland YBE's	15	9.4	14	29.5
Dry hygrous HCYBE's	34	6.7	25	53.9
Hygrous HCYBE's	120	6.0	60	48.7

Economic sustainability of development

From 1976/1978 experience both at individual block level and at the level of the whole run, we can recognise that sustainability of topdressed grassland use may be very much an economic concern. This concern is heightened by the recent record of fertiliser use per stock unit for hill country and high country. For these data in Figure 3, I am indebted to Michael Abrahamson's analysis of fertiliser use since 1969/70 for South Island hill country and high country properties surveyed by the Economic Service of the Meat and Wool Boards. These are presented in relation to a projection of his estimated "long-term P" needs for both pasture establishment and maintenance calculated at an "average farmer" stocking rate on a 1980/81 base. As this estimate of "long-term P needs" is calculated for a composite of hill country and high country soil resources, it can have little reference value for different groups of runs. Nevertheless the data indicate that on South Island hill country farms, livestock have suffered what might be called a phosphate recession after a period of relative bounty. High country livestock have been, since 1981/82, on similar declining

superphosphate rations to hill country livestock. North Island hill farm livestock during the 1980s have been on similar superphosphate rations to South Island high country livestock although the calculated "long-term P needs" are about 40 percent higher for North Island hill farms (M. Abrahamson pers. comm.).

Table 5. Resource and production features of two groups of runs, subhumid and humid in upper Waitaki, 1976-78

	Subhumid runs (Group 6)	Humid runs (Group 9)
LAND RESOURCES		
Mean total area	9 430 ha	15 105
% hygrous floodplains	2.7	5.7
% terraces & fans	11.4	7.2
% rolling land & hills	24.5	21.5
% subhygrous steeplands	31.8	2.3
% hygrous steeplands	13.5	41.6
% bare rock & scree	3.3	18.7
LAND DEVELOPMENT		
Mean area of crops & improved pastures	977	871
Mean fertiliser tonnes	61	64
LIVESTOCK RESOURCES		
Mean total cattle	256	290
Mean total sheep	7 123	5 881
% breeding ewes	49	34
% flock wethers	22	39
LIVESTOCK PRODUCTION VALUE		
Mean total value sales $	98 750	65 551
$ value per man year	30 385	30 920
$ value per fertiliser tonne	1 619	1 018
$ value per ha improved	101.1	75.3
$ value per stock unit	14.4	11.0

This statement of hill farming phosphate perspective in contemporary New Zealand raises more questions than it answers. It indicates that South Island high country land use has journeyed so far from traditional pastoralism that it has joined the pastoral farming fraternity of superphosphate dependence. For how long can land and livestock prosper on short rations is a question greatly affected by the kind of soil resources and the previous history of development. For how long can a high country

pastoral farmer maintain development in the face of adverse terms of trade is a question greatly affected by the scale of his enterprise, his own financial position and especially the length of previous history of development.

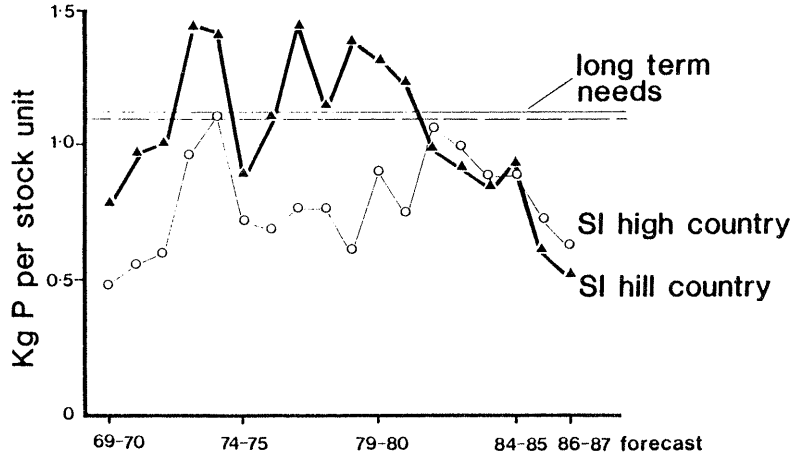

Figure 3. Recent changes in use of phosphate per stock unit on South Island hill country and high country properties under survey by Economic Service of N.Z. Meat and Wool Boards, in relation to a projection of long term phosphorus needs (M.Abrahamson pers. comm.)

These are issues of economic sustainability in which there are many land use and ecologic aspects. With such many different viewpoints, have high country runholders turned to various commercial recreation and touristic enterprises to enable them to win a livelihood and continue to live life as they have enjoyed it. With perhaps longer term ecologic perspective have I elsewhere suggested (O'Connor, 1986a) that agroforestry should be investigated for its prospect of restoring the deeper soil phosphorus organic regime to which past high country forests and their soils were probably attuned. It would be fortunate to have the nutrient regimes of our planted forests without having to pay for fertiliser! (I am well aware that bills and rent have to be paid while we care for forests for which we

have no planned market. Such issues also require investigation.)

The relevance of diversity to sustainability

These allusions to recreation and forestry as land uses accessory to pastoral farming suggest a parallel in diversity between ecology and land use. Just as ecologists point to diversity in nature as an assurance for its persistence, so do land users see in a mixture of enterprises the greater prospect of sustainability. Not every joint or accessory use is truly complementary. Beginning in such a way, even the mildest of accessory enterprises can become a tyrant, competing for land or cash resources, energy, attention.

There are some situations in which pastoral use of unimproved range can be considered accessory to pastoral farming development. For many pastoral enterprises where 70, 80 or 90 percent of the total stock load is carried on developed grasslands, the remaining load may be borne on a large, undeveloped portion of the run. Such a seasonal contribution may be much more significant than its numerical value. "Summer country" blocks have had such a role. Not all of them are equally tolerant of their traditional use.

In the snow basins and on the high steeper slopes there has sometimes been enough natural breakdown of rock material to keep the topsoils alive and vigorous. If such drift regimes operate without overwhelming the vegetation, then there has been no dramatic system aging. For many steeplands, there has always been periodic landscape rejuvenation. For all such lands there has always been the risk that harsh climate would prevent recovery following depletion, even of relatively stable vegetation-soil systems. The problem can be aggravated by periodic events. White (1978) has shown how some such alpine systems have such low productivity that they cannot stand grazing even by grasshoppers.

I believe that there are still runholders and shepherds who know how to manage such alpine basin and steepland systems carefully, observantly and intuitively. I have no clear evidence to argue that such careful, seasonal use is never sustainable ecologically. I think there is abundant evidence that runholders have questioned its economic sustainability. I believe that they have arrived at different answers in different situations. I suggest that they should be prepared to question also the ecologic sustainability of the practice. I believe that their answers would also vary from one situation to another.

What I would affirm is that, as a use system, high basin and steepland grazing remains full of risks. It probably also has some unsuspected vegetation costs and it may be that these affect other elements in the system. It was surprise enough to observe the recovery of alpine grasses and buttercups when deer numbers were reduced in the wetter mountains. It is even more surprising to discover how deer had been imposing hunger on takahe and kea and affecting their habitats in turn. Hungry takahe quietly become extinct. Hungry kea first make others pay!

What I equally recognize is that many runholders regard high altitude grazing as a vital adjunct to lower altitude pastoral development. Sometimes this is true. Sometimes the uses are competitive rather than complementary. Runholders' attitudes and conservationists' attitudes may be both economically and ecologically justified, in different circumstances. Sometimes these attitudes may, like the smoke from Samuel Butler's burning, obscure deeper, proprietary attitudes. Runholders have no monopoly of smoke screens or of the attitudes behind them, as anyone well knows who is familiar with mountain land use in different parts of the world.

Review

What I have attempted to do is analyse pastoral experience, traditional and contemporary, in the light of our emergent ecological understanding. It may be that I

shall be found to be wrong, just as Leonard Cockayne has been found to be wrong in some respects. I expect to be found wrong eventually, clouded by the smoke of past opinion, perhaps insufficiently illuminated by phosphorus, the light-bearer. At least I hope to be stimulating, as Cockayne was.

I find that mainline pastoral use of unimproved grasslands was sustainable only on better soils with favourable moisture regimes. It was there sustainable only by inducing a grazing-adapted vegetation. As even this practice had become economically marginal by the time the current Land Act provided for its perpetuation, it is little wonder that it has yielded place so dramatically to more effective pastoral farming. It is ironic that the same law provided for the classification of such land as unsuited for farming of any kind but suited for pastoral use, even though this last was patently unsustainable!

When I have expounded this situation internationally (O'Connor et al. 1986), I have recognized that there are parallels in the pastoral history of Australia and of the western United States of America. I now note the irony that the present crisis of discerning public interest in mountain lands occurs in the midst of redefinition of the directions and functions of the public sector (Clark and Sinclair, 1986). It would not be the first time that we diverted our attention to how we hold land when we should be giving central attention to how we use land.

I find that pastoral farming has been supplanting pastoralism and that nature conservation is critically suffering in consequence in the lowland and montane zones. Ironically, pastoral farming is here recognized as the only feasible way by which tussock grassland country could be protected from total occupation by already present conifers. It is a further irony that forestry in some form may be essential in order to provide for long term economy of access to the phosphate resources necessary for pastoral farming (O'Connor 1986a). Forest trees become a necessity to culture and a threat to nature in

an environment long deprived of them. The separation of forestry and farming can no longer be endured.

Planning for pastoral farming development is imperative in order to preserve somewhere the familiar landscape values of tussock grasslands. Characterising the natural and landscape values of tussock grasslands and discriminating among them (Ashdown and Lucas, 1987) must be followed by sustained community exercises in which different and potentially conflicting objectives are integrated into particular landscapes (Swaffield and Lucas, 1985, O'Connor and Swaffield, 1987). As examples of issues in which local communities must take a controlling function I append a short list. For each of these agenda, co-operation among neighbours is essential, both in planning and in execution. Because the landscapes resulting from such human actions are the environment of us all and because their quality will greatly affect the economy and satisfaction of our uses of them, those local communities responsible need the best in regional and national professional and technical services. Only the best is good enough for the land.

Alternative agenda for "pastoral lands"

1. For semi-arid, former Elymus grasslands and rocky shrublands, develop new land use programmes that control rabbits, sheep, weeds and pine trees, revegetate land positively and make better use of this most magnificent light and landscape of Central Otago.

2. For sub-humid Elymus-Poa-Festuca remnant grasslands and shrublands of Southland, Otago, Canterbury, Marlborough, develop new pastoral farming systems that accommodate other uses including forestry and tree-crops so that new landscapes are created to replace some of the ones we have defaced.

3. For humid "tussock grasslands" where we have fondly conceived the Polynesian legacy as natural heritage landscapes, develop new agroforestry and pastoral

farming systems that restore topsoil fertility, economise on fertiliser inputs, control the spread of conifers, and so create new forest and grassland landscapes instead of accepting as inevitable those which our past actions have set in becoming.

4. In all districts and all communities, acknowledge daily both formally and informally that we are mountain people, living, working and playing in the mountains and between the mountains and the sea, so that we create a landship spirit in which visitors are welcome, and in which we never dare again to think we can take something for nothing.

5. In all these climates and landscapes, reserve and maintain effective islands of nature, both those managed to represent the diversity that is our heritage and those allowed to evolve what is our future.

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A financier's view

Mr Robert Dewar*

One would like to think that the de-regulation and withdrawal of the farming industry's support or subsidisation by the Government has not effected the financiers' views at all as the basic sound rules of financing should never have been effected by the introduction of the support in the first place. However, that would be a purist view and reality tells me that the financiers' views have changed and will continue to do so with further change in the farming scene. Change that seems to be gathering every increasing pace. Some of the recent entrants into farm financing will just as quickly, I believe, exit the scene.

The recent sudden change however has been a trying and testing one for the farmer and financier alike. Few, if any, in our industry have worked through such a difficult period before. It has called for new thinking, actions that one would not have dreamed of, and, more importantly, understanding of other parties' problems and point of view. Farmers have suffered stress, so too have the representatives of the financiers.

Fortunately few of my Company's high and hill country clients have been in the difficult category and therefore many of my comments are based on experiences in other classes of farming. Likewise it is difficult to totally assess the effects of a market economy given that we are still suffering from interference in interest rates and many imported goods face tariffs in protection of locally-manufactured items.

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What are the lessons for the future?

■ To maintain a more flexible attitude in all matters.

Do not get taken in by Government policy. Some five years ago you could have been excused for thinking that the Government of this country had guaranteed farming for a period of at least 10 to 12 years. Farmers were encouraged to develop towards increased production and in so doing to enter into development loans through the Rural Bank. They were told by many Government agencies and others that it was a good thing for the country and them and that they should go all-out. "Do not just develop the part of the property that you were thinking of doing, do it all while the cost is lower and of course you won't pay tax." That may have worked out fine if the guaranteed period had not markedly been reduced with the change of Government.

The present Government has said that to overcome your current problems you should diversify. Take care if you are contemplating this. Diversification must be soundly based and sustainable into the future. In most cases it will take capital as well as ideas and manpower. The lesson - do not get taken in by policies that look too good to be true.

■ Lending must be based on the norm. How do you assess that norm? Only by sound judgement and using the rules contained in the book of common sense. Forget the prediction of high prices and budget at a realistic level.

Many borrowers and lenders went astray because of the very high valuations that were placed on farming properties with valuers following their noses in terms of the provisions of the Valuation Act and the market place. False valuations arose out of a series of chain deals and swap sales; each of these excessive prices fed into the valuation comparisons and no consideration was given to the production value. More importantly often when completing the loan recommendation very little

consideration was given as to how the interest costs could be serviced.

The lesson for lenders and borrowers alike - do not rely on value only. Make sure you know the person completing the valuation is competent. Just because he happens to be a registered valuer does not make him that, nor necessarily a suitable person on whom a financier should rely in terms of granting loans.

Most experienced financiers will have a list of valuers from whom they will accept valuations and another list from whom valuations are looked at in a different light. The same principle applies in all walks of life. Judgement is all important.

■ Financiers must not lend for the wrong reasons. They must not lend just to gain business. If they miss out through declining an application because they won't vary their terms then their funds will be met with the demand from elsewhere. Terms of financing must suit both parties. Incorrect financing helps neither party. What is good for one party is usually good for the other.

For example, my Company's Trust Department had a general rule in farm lending whereby the maximum it would lend was the higher figure of 50 percent of a valuation prepared by a party appointed by our Company or such lower figure that was also supported by that valuation and could in the valuer's (and our) view be serviced. Often we would get comment from farmer's accountants and/or their solicitors that they could not understand our policy and that the Trustee Act provided that we could lend trust monies to 66 2/3 percent and that there was no reason why we should not lend up to that figure. In many cases the valuer would have approved a figure higher than 50 percent. Our answer to that was that we did not in fact write the Trustee Act and likewise we were not compelled to lend funds on mortgage. We had set our lending principles and wouldn't vary from them. That policy in these times has proved to be a good one. Make your own standards and although

they may be criticised by a few who cannot get their own way, stick with these principles. If we had varied our policies then, today we would have had a lot of difficulties with our mortgage advances and likewise would have contributed to leading many more farmers into unhappy situations. Lenders will concern themselves with the overall financing arrangement not just their particular section of it.

As farmers, you should be careful from whom you borrow funds. You should endeavour to borrow from parties who understand your industry. It is noticeable that in the great number of cases where farmers are in difficulties, they have borrowed from outside the traditional sources, from brokers with offshore loans, from finance companies, or have committed the mistake of borrowing on overdraft not only from their traditional bankers but from two or three other sources at the same time.

Up till now at least finance companies and their like work on a high gearing and depend on relatively short term funds and any lift in interest rates has a much greater effect on the borrower. Likewise because their funds are borrowed in turn the nature of their business demands a greater margin. It could also be true in the near future that their rates could fall more quickly if we go through a period of heavily reduced interest rates. A lot of these fringe lenders have had their fingers burnt and I believe will now retreat from farm lending.

■ Borrow from organisations which have an understanding of farming and are likely to continue to support the farming community.

Many of the sales at high prices in the past have been achieved through vendor mortgage finance, sometimes at reduced rates. Whilst is it true that many vendors have continued to be kindly to the new owner it is equally true that a number have shown little or no sympathy. In any event vendor mortgages are, and will be, difficult to refinance and lenders will be wary of taking up, say, a first mortgage security where vendors have funds secured

by second or later mortgages as they will obviously at some stage need to be re-financed.

Certainly it has been a strange experience for us as financiers to attend discount meetings and find that vendors who had received very good prices for their properties were taking the hardest line of any at the meeting. Take care in your haste to add further land holdings to your unit that you do not grasp at too large a vendor mortgage and bring down your whole enterprise.

Farmers will need to present their case well when endeavouring to borrow mortgage or seasonal finance. The lenders will be looking at each case on its merits in terms of the individual, the security, and the servicing.

The comprehensive information supplied should include past accounts, budget and cash flow statements based on realistic figures. Having been granted the loan you should endeavour to keep your relations with the lender at a good level by supplying him with future annual accounts, requested or not, and advising him or involving him in the decisions regarding future change in directions.

Farming has suffered from a lot of bad publicity in the last two years and this must of necessity act as a deterrent towards the re-investment of funds by private individuals and institutions. It is therefore apparent that there will be less funds available for the financing of farms, as investors turn to other sectors. Generally speaking farming will need to survive on a greater percentage of equity. The amalgamation of land holdings will, I believe, become more popular and of course we have seen the re-introduction of corporate farming. However, these corporations in turn will only prove successful if they likewise have low borrowings. For my part I do not see individual farmers or family farming disappearing and I believe that adequate finance will be available for soundly based propositions. In turn I also believe that the proper financing of farming will provide excellent securities for investors. With the de-regulation

of the banking world we may even see greater competition from new banks to lend to the farming community. However, it is too early to forecast that at this stage.

Farmers must purchase land and buildings at a realistic price - a price which will allow the farm to be run as a business and to produce a net income that will provide for the payment of tax and personal expenditure. Farms must be purchased at a price which will produce income after tax that can, over a period of years, provide the funds required for plant replacement and as reserved for the likely bad years. In the fifties most people in the high country established snow loss reserves and I am aware that a lot of people still use the equalisation deposit scheme. More should do so and the Government in turn should encourage its greater use by increasing the rate of interest credited on these deposits. Farmers must run their farms as businesses and not depend on hand-outs. To achieve this they may well need to adopt a policy of optimum output rather than maximum output. Under a market economy those that manage their affairs well will make progress - those that do not, will struggle.

A farm consultant's view

Mr Robert Engelbrecht*

My paper is based on the experiences of farmers and the rural sector generally as they have been exposed to the changes over the past two or three years.

I shall list 12 important statements, which relate to what has happened in this period. (They are not necessarily totally related to this period or exclusively to this period.) I shall expand on the statements and consider the options and alternatives open to individual farmers and the farming industry as a whole.

Many of the points raised, are not new but we now understand them better, others have become more vivid as a result of recent Government policies.

Some of the statements overlap significantly, some relate to individual farmers others to the farming industry as a whole. Furthermore, many of the statements reflect very "short term" thinking but, to achieve the medium and long term, we must first survive the short term.

I don't agree with many of the statements but whatever I think or you think is unimportant. It is what the majority thinks that finally influences the policies of our decision makers.

Let me also state that I have no political affiliations. In my view, membership of <u>any</u> political party tends to cloud one's objectivity.

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1. There are some things that we can change, but there are many that we cannot change.

We must direct our energies to areas that we can influence. We can discuss politics, all day, everyday. We can discuss the inequities and lack of evenhandness with which Government policies are applied. We can agree that many, perhaps most, farmers are suffering from the economic downturn - the "rural" economic downturn - more than almost any other section of the New Zealand community.

Those who may disagree with that proposition are those who have substantial off-farm investments and/or those who have little or no farm debt.

However, we must ignore the politics that presently surround us. The lesson is

More than ever before, as farmers or farm servicing industries, we must pursue with a total commitment and single-mindedness of purpose, our individual survival for the next year or two.

2. Governments change from time to time, policies of the same Government change from time to time, politicians change their minds and directions from time to time.

A politician's first and main objective is to stay in power, believe it or not. That means, gaining the support of the majority of people in each electorate and providing policies that suit, superficially at least, the majority of the voting public.

Unfortunately, many voters forget what they have been told, unless they are directly affected by political decisions.

Many were led into farming, or further into farming, for capital gain and this was accepted by many, economists

and politicians included, as a form of return on the individual farmer's investment.

Farmers followed what the Government of the day interpreted as "market signals", but then faced another Government who took an "about turn", stating "sorry, the previous Government made a wrong judgement, but you must bear the costs of that mistake".

We have, of course, had Government promises on interest rates and inflation, promises that things will be better next year. While they, the politicians, may be able to get away with promises, you, as farmers cannot. Bank managers and mercantile firm managers are singularly unimpressed with the promises of a decrease in the overdraft next year, or the year after, following the promise you made for a reduction in overdraft this year and didn't achieve.

In respect of politicians and their comments, let me quote from Roger Douglas's book "There's got to be a better way" - published in November 1980, four years prior to the 8th November 1984 Budget, when so many of the decisions that have hit farmers so hard were announced. His introduction to the book reads as follows:-

> "As at no other time in its history, New Zealand stands a divided, confused, dispirited nation. It lacks a sense of clear direction for the future. Its loyalties are torn between conflicting interests, each determined to extract the maximum for itself with no regard for others. Its standard of living has dropped and continues to drop visibly. It stands on the brink of economic ruin. It has stifled innovation for mediocrity. Because of this it is losing thousands of New Zealanders, most of them young, each year. New Zealand is a nation that has lost its spirit, the fire in its belly? How much further will New Zealand sink before we start to fight back? How do we break out of

our present economic and social morass? This book attempts to provide some answers."

I believe that those comments may be even more appropriate today. Let me take some statements from the text of the book itself.

From Page (14) - on: Balance of Payments

"We cannot permit increased volumes of imports because we are already running a large external deficit and the borrowing we have indulged in to finance this deficit is making the problem steadily worse."

From page (22) - on: Devaluation

"Devalue to the point where New Zealand businesses can stand on their own feet in the outside world, without taxpayers' props. Where is that point? At the point where an efficient farmer producing a saleable product can cover his costs, make a decent income and have money over for re-investment to increase production. (The Douglas Index of International Competitiveness)."

From page (29) - on: Farming

"Farming is still the key to our economic future. About 85 percent of our exports are land-based products. Unless we drastically increase exports of those products, we will not break out of our stagnation. We have the knowledge, now, to double our agricultural production. And sell it. So why don't we? Change the tax system, to reward the productive farmer and penalise the one that just waits for his capital gain. At present it's the other way round."

From page (38) - on: How Governments Can Influence Interest Rate

"At present the Government simply offers an interest rate high enough to attract the funds it

needs. This has not only pushed up interest rates, but also pushed up the prices of Government services."

From page (55) - on: Objectives

"Agriculture: to double agricultural output within 15 years."

From page (69) - on: Tax Assets and Capital Too

"In the case of farmers, the capital and assets tax would:

- reward farmers working on their own land and penalise Queen Street farmers looking for a tax loss. This in fact would no longer be available.
- help control land prices, since tax would automatically rise with rising prices paid
- help young farmers on to the land
- discourage aggregation of land by big companies,

It would reward production, by leaving all income above the tax level in the hands of the company or farm for distribution to shareholders or owners."

From page (74) - on Wages

"Wages are not just a problem in the private sector. They are a major ingredient of Government spending. If Government spending goes up, so do taxes. So we must hold down wage costs in the public sector."

One has to seriously question how someone with such fixed views on a range of important subjects could change those views in such a short period as four years.

In his recent book "Toward Prosperity" (published June 1987) Roger Douglas states (p.9):

"This second book tells the story of how my 1980 ABC of ideas, written in the wilderness, became part of the official policy of the Labour Party and helped lay the foundation for the

fourth Labour Government's plan to breathe new life into the New Zealand economy. How those ideas are changing the face of this nation and transforming its future prospects. How we have set in motion a creative process of economic development which will, over time, bring new freedom and greater prosperity to the lives of all New Zealanders as they take up the challenge offered in the opportunities we have opened up to them.
The New Zealand Labour Party has not changed its goals."

That statement seems to me to be quite inconsistent with those statements I have quoted from his first book.

The lesson is -

Don't believe politicians of any persuasion, depend upon your own judgements.

3. A free market economy as enunciated by Government may be a qualified free market economy.

Some may call it double standards, but there are a number of areas where the economy does not operate freely.

The obvious areas relevant to farming are, of course, that of tariffs (which are estimated to cost the average farmer $15,000 annually - certainly, a slight reduction from what this cost once was), and the labour market, which is still relatively rigidly structured.

A more recent area of concern is that of interest rates and exchange rates, which are currently being influenced by Reserve Bank policy.

No doubt, there are very good fiscal and economic reasons for the measures being taken other than, of course, political considerations.

The test will be whether or not continued "freeing up" of our economy will continue at a satisfactory rate.

Also, what system is there in place to ensure that there will be efficiency of operation of State-owned Enterprises (S.O.Es) and other monopolies? Where there is no competition and unknown accountability?

The lesson is -

Don't count on a totally free New Zealand economy.

4. The rural sector in New Zealand has very little political clout.

The group primarily responsible for 60 percent to 70 percent of New Zealand's export income represents only 10 percent to 15 percent of its population, and this is currently declining further still.

The majority of New Zealanders live in the Auckland region and other large cities. They are totally insulated from the affairs of the rural sector and many could not care less for the welfare of their country cousins.

On the world scene, of course, New Zealand is not important at all.

The rest of the world has no reason to remove tariffs or other forms of protection for its own primary producers, at least not at a particularly fast rate.

The truth is, that if someone were to cut the rope tonight and New Zealand were to slip quietly under the sea, most of the world would not even know that it had happened, let alone care.

There are some 300 nations in the world. As World Cup Rugby winners, from a group of only 16 nations, we are not all that important.

The lesson is -

In order to exert some political influence, farmers may have to arrange an association or partnership with other disadvantaged groups, perhaps some areas of suburban New Zealand, to achieve a greater power-base to influence the future direction of the New Zealand economy.

5. The free enterprise system encourages an extremely competitive approach, perhaps a ruthless approach by those with power.

Some may say, excessively so - a "dog eat dog" approach. This is especially the case with those who, at least for the time being, have the strength of the bargaining position.

Farmers are, by definition, weak sellers. This is not a reflection on the individuals involved but simply a statement of fact. Farmers are a large group of individually small businessmen - approximately 50,000 in number - who deal, generally, with a small group of relatively large processors, traders, or consumer representatives - frequently in an oversupplied market. They have the strength of the bargaining position.

In a fully competitive economy, of course, the labour market is free to move and tariffs should not exist.

In a fully free-enterprise economy, I believe, the rich will get richer, the poor will become poorer still and the average will become the new poor. In this technological and computer age, the rich can afford all the advantages of playing the market, whatever and wherever it is.

Farmers have depended on others in the past -individuals and groups - for support and servicing, frequently at no direct cost. This, of course, was built into the individual economic equation.

The removal of free or partially-free services and facilities provided by various Government agencies, has significantly exposed farmers to higher costs. Producers depended upon others, including Government agencies, processing and marketing companies, to interpret market signals on their behalf.

There is now more money to be made or lost on the telephone than there is on the tractor, or the high country hack. How many company chief executives spend most of their time on the factory floor?

"I'll see you right" and "I'll give you the best deal possible" is no longer acceptable. The traditional loyalties to the mercantile firm or the freezing company may now have to be brushed aside, unless that loyalty is genuinely and totally reciprocated.

To be frank, many farmers find this situation somewhat uncomfortable, having being used to the situation where a man's word was his bond. If farmers wish to survive and prosper under current rules, they may have to change their approach. I am not aware, of any of these industries referred to having standard redundancy arrangements for farmer clients.

Farmers must keep themselves free to market their products at the best possible price and terms. To this end, co-operative marketing and buying must become important features of the rural servicing industries. Farmers must become price makers, rather than price takers, based appropriately on premiums and discounts for quality, delivery and other factors as determined by the buyers.

Equally, on the input side, purchasing of farm services and supplies in forms such as bulk purchasing or collective arrangements will be necessary to minimise costs.

Many farmers may choose to broaden their base of investments from their present almost exclusively on-farm

portfolio, to a greater reliance on off-farm investment, if and when the opportunity arises.

The lesson is -

Farmers should make their own decisions based on benefits to themselves and their families. They must rely on their own ability and enterpise to survive.

6. There are many people in positions of influence, power and decision making who believe that it is not necessary to have a vigorous and dynamic rural economy for New Zealand to survive and prosper as a nation.

This, is in spite of Roger Douglas' comments, published in November 1980, that

> "Farming is still the key to our economic future". "We have the knowledge now to double our agricultural production and sell it" and objective number (1) for New Zealand "Agriculture - to double agricultural output within 15 years."

There is no doubt, that the economies of large cities such as Auckland and Wellington in particular, can be sustained for a long period of time, perhaps indefinitely, on their own impetus.

Equally, there is no doubt that our trading partners will not offer assistance for our economy, or any part of it, in preference to the demands of their own people.

The lesson is -

In the meantime, farmers must rely on their own judgement and ability and not expect a turnaround because the "Country needs you". The majority of New Zealand people no longer believe that to be true.

7. Whether we like it or not, farm production will continue (albeit at a lower level than at present) without the current farmers necessarily being present.

The sheep will still grow wool, the ewes will have lambs (at least most of the time), the cows will have calves and someone will harvest these crops.

Unfortunately, the greatest losers in any attempt to turn-off production will be the individual farmers themselves. Ironically, for them to survive, they will have to continue to produce.

Only in the odd cases, where the reduction in output is exceeded by cost savings, is it appropriate to reduce farm production.

So, you are captive producers - like it or not!

One prominent expert, from the comfort, security and relative luxury of his University career has already said publicly on television that

> "It does not matter too much if farmers go bankrupt and are forced off their farms. The farms will still be there and they will still continue to produce."

In short term, at least, he is correct.

The lesson is -

Individual farmers must assess the situation very very carefully, before cutting back production. Will their savings in the short term exceed the reduction in income from reduced saleable product.

8. Farmers are still seen by many of New Zealand's population as a privileged group in the total community.

In past times, farmers as a group and as individuals have had bad public relations with the rest of New Zealand. Many see the present changes as redressing the imbalance that previously existed between town and country.

Farmers have, of course, been the initial recipient of many subsidies, incentives and the like, paid by the New Zealand tax payer over the years. They have frequently been regarded by the urban dweller as "the dumb son that stayed at home, plays golf three days a week and for the rest of his time sits and watches the grass grow and the money roll in".

In spite of what you and I know for many individual situations, farmers still have the public image of having a strong capital and asset base, a good cash income, a high standard of living and a very pleasant way of life - still, in spite of all that has happened.

I know the truth of the situation.

Everyone, of course, can look over your fence and see how efficient you are by the condition of your stock or by the length of your pastures.

Many farmers have taken individual ego trips regularly by their claims of no tax paid when they could avoid it, high tax paid when they couldn't avoid it, overseas trips, boarding school for the kids, big boats, large cars, etc. etc. ad nauseum.

And the way of life, of course, justifies the choice of not actually making much money at all.

There have, of course, not been too many farms subject to mortgagee sale-farmers who had to leave farming - certainly not 5,000 or 8,000 as had been claimed would happen.

I believe I know and could explain, if there were time, the reasons why this landslide of sales has not occurred. This is not to say the problem does not exist. It still remains an extremely serious situation, particularly in Canterbury. And there is little light at the end of the tunnel.

I have said, and I still believe it to be the case, that my average farmer client, would beat the average Ashburton (or for that matter, Christchurch or even Auckland) businessman "hand down", put in the equivalent position. Most farmers make more significant decisions in a week than many so-called "business people" make in a month or even a year.

The public relations of farmers through their various organisations and lobby groups has been improved in recent years, but still has much to be done. They need more professionals and professionalism at all levels, in order to reverse the many misconceptions that have been built up and entrenched over the past twenty or thirty years.

In the past, too, many farming leaders have not been truly representative of the industry as a whole.

The lesson is -

People believe what they choose to believe - what suits their feelings for the time being. Frequently endeavouring to dispute those beliefs only serves to confirm them more strongly than before.

9. Past Government policy, tax and incentive systems have distorted farm investment decisions.

Of this there is no doubt. Farm production was increased, perhaps beyond appropriate levels, (although I personally believe it to be a case of "undermarketing" rather than "over production"). Farmers farmed for capital gain rather than taxable and cash profits.

Finance was provided by lenders on the basis of equity and asset backing, rather than on profitability.

We were all bluffed by tax incentives, by Livestock Incentive Schemes, Land Development Encouragement Loans, fertiliser subsidies, etc. - the list goes on and on.

The situation was only the fault of the farmers who responded to the Schemes and Incentives provided, but also the fault of the politicians and decision makers. We are all guilty - Government, Government Agencies, Banks, Stock Firms, Mortgagees, Farm Consultants - as well as farmers themselves.

Unfortunately, only the farmers and businesses closely associated with farming are suffering the consequences of earlier Government policies.

The rules have now changed. With the phasing out of farm development deductibility, input subsidies, livestock standard values, plant investment allowances and a raft of other assistance measures, farms and farmers will now have to achieve taxable profits in most years in order to maintain or improve liquidity.

(Mind you, as Minister of Finance, I too could increase returns on investment by setting the circumstances for halving the value of that investment - when we consider the change in value of land and buildings, plant and equipment and livestock.)

Perhaps a Capital Gains Tax would be appropriate. The Honourable Roger Douglas, in applying much of the present farm medicine, suggested that unearned wealth in the form of farm value increases, was not equitable. How then, does this logic apply to the recent changes in both commercial and residential property values in the urban areas? Capital Gains Tax, however, should be applied from an equal base, rather than from current asset values. Perhaps, back-dated to 1984?

It could be said that the current "neutral" tax system may well distort farmer investment and encourage it in a different direction. I believe it will do that significantly - off-farm!

The lesson is -

All "bona fide" farmers will need to make a taxable profit in future to survive. Farmers should become aware,

well aware, of how the new tax system will apply to them.

It has been said that the 1986/87 season has been a good year financially for many livestock farmers. Don't be fooled by what may be an Indian Summer. If Prime Minister Lange thinks that the turnaround in farming has occurred, that farmers are now in support of Government policies, then let me put his mind at rest. That is certainly not the majority farmer view.

If account was taken of deferred fertiliser and lime applications, deferred repairs and maintenance, deferred plant replacement, deferred losses and future income tax commitments - then the so-called good financial year for some livestock farmers in 1986/87 may be a very different reality.

So, the other lesson here is -

There is little point in achieving farm profits if, at the same time, the asset which produces these profits is being less than adequately maintained.

10. Farm production decreases are easier to achieve and more quickly achieved than are farm production increases.

I know only too well, the long slow haul from low production and performance through to improved production, performance and profitability.

This will be even more difficult in future, with no tax deductibility for development and, almost certainly, farmer reluctance to borrow to develop.

The phosphate "bank" on many farms is declining rapidly.

Many farmer speakers at this conference have mentioned the decline in topdressing and general fertiliser use that many farmers have adopted in order to remain viable in the short term.

Research clearly shows that avoiding fertiliser applications has severe long term implications.

A Ministry of Agriculture and Fisheries Scientist Dr A.G. Gillingham, has recently pointed out that where previously an average of 20 kg of superphosphate was used per stock unit on sheep and beef farms in the 1970s, the level is now nearer 10 kg. During the year ended June 1986, topdressing aircraft spread only one third of the fertiliser previously regarded as normal on hill country. This halt in topdressing has serious effects on feed supply in late winter and early spring, the period which most often determines overall stocking rate.

Dr Gillingham points out that the farmer most at risk from a sudden cut in fertiliser use is the one who has been doing everything correctly up to now. A sudden halt to topdressing will be sharply felt in stock performance. As soil fertility declines the winter feed gap widens.

The late Dr Magnus Mouat has pointed out that when fertiliser applications stop on moist hill country, reversion to browntop and other inferior species can be very rapid. The lesson yet to be learnt from this lower fertiliser application is that to restore pastures to their previous highly productive level will require much more fertiliser than the amount not applied in the interests of "economy".

As mentioned previously, some farmers are almost starting to feel comfortable with the situation of reduced or no fertiliser use, where the effects of soil fertility reduction have not yet become evident.

It would be fair to state, I believe, that much of the ability to farm at present with little or no fertiliser use, is in fact related to the high fertiliser and lime inputs made during the relatively more buoyant times immediately prior to the present recession in farming.

The lesson is -

If at all possible, maintain soil fertility and pasture quality and livestock performance. The cost of going down in soil fertility and back up again will be enormous - in fact, probably prohibitive.

11. Diversification is not necessarily the answer.

If you choose to diversify, take care.

We only hear the successful diversification stories. Most of the failures are no longer around to tell their story, anyway.

Diversification usually takes new capital, new skills and disciplines and frequently has a long-lead time to achieve a positive cashflow. In times of high interest rates and high inflation rates, long lead-times reduce very significantly the return on any long-term investment.

Prime Minister Lange has stated that New Zealand needs entrepreneural farmers. May I suggest that his Government has stifled the enterprise from many entrepreneural farmers we once had.

The lesson is -

Approach any farm diversification option with extreme caution.

12. Under present terms and conditions for farming, farmers with average or greater debt levels, must be above average performers in order to ensure their survival.

This means, not only in the production sense, where once being technically very competent was adequate, but in the business sense as well.

One can argue that this state of affairs is not equitable or fair but, unfortunately, it may be fact.

If you don't accept these terms for survival, then you should consider another job opportunity, perhaps as a farm consultant or politician or university lecturer -where being average may be adequate enough.

I can identify amongst my clients those who reacted quickly to the change in Government policy and subsequent farming downturn and those who did not. While the prospects may be good for farming in the medium and longer term (and I believe they will be), one of the prerequisites for achieving the benefits of the future is to survive the short term.

While there will be help and assistance out there, it will only be forthcoming if farmers have taken the appropriate decisions (and sacrifices in many cases), to show those that service them, that farmers are in the game for real.

The message should be very clear.

Summary

I do not accept the validity of many of the statements I have discussed. I am equally sure that many of my comments will be taken out of context.

However, there are people out there who believe in the future of rural communities, the future of farming and farming people, the resilience and innovative approach necessary for survival of farmers and farm servicing communities.

There are people who still wish, strangely enough, to remain a part of that struggle for survival and the benefits for those who are determined enough to stay with their chosen vocation.

Let me predict the comment of politicians and Government officials - perhaps five years out from now.

> "If only we had known the real facts of the situation".

The message is very clear - don't depend on others to make it happen for you.

Motivation and attitude are extremely important. Make sure that you have done everything possible on your side of the fence, that you have the "i's" dotted and the "t's" crossed.

That will be the incentive and, may be, the necessary catalyst to achieve the assistance necessary to ensure your future in farming.

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A politician's view

Mr David J. Butcher M.P.*

New Zealanders pride themselves on leading the world in many ways. We particularly pride ourselves on our pragmatism and our ability to solve problems. Over the years this has frequently meant devising ways to protect sectors of our economy in order to promote their growth.

Confronted with the inevitable cost effects imposed on all other sectors of the economy, we have devised equally ineffective ways of protecting the rest of the economy from our earlier ad hoc interventions, reducing our competitiveness and cutting our real incomes.

In the last three years the present Government has led the world in dismantling arbitrary and heavily distorted "assistance". Ad hoc intervention has proven a very inefficient way to redistribute income within a community.

The Government has sought to make assistance more explicit, by direct transfers which impose fewer costs on the community, and are more easily targetted to those in need. It is unarguable that our endeavours to even out and phase down assistance to various sectors in the economy, have inflicted much unavoidable pain. This is particularly as it effects farming, but without pain there would have been no change.

In the years leading up to this effort to change direction, New Zealand experienced a period of progressive decline in all our economic indicators. Decline was greatest in

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those indicators which measure the efficiency of our economic activity. This process of decline brought us to the point of unprecedented economic crisis. Crisis has been followed by a traumatic period of adjustment, which is now slowly developing into a search for new directions, renewal and regain in self confidence.

Where were we?

Nobody in this audience needs to be reminded that New Zealand farming developed out of our colonial relationship with the United Kingdom, in the complementary nature of our two economies. The imbalance in this relationship which imposed harsh living conditions in our cities, led to the political demand to develop alternative employment opportunities for city dwellers.

The chosen method of development, import licensing and tariff protection, developed almost accidentally out of the coincidence of a foreign exchange crisis in 1938 and the onset of the Second World War. This policy meant essentially that pastoral farm exports, were taxed to pay for the policy of industrialisation. This tax was imposed through both reduced export returns and through a higher cost structure in New Zealand.

Over the years assistance to agriculture developed to compensate farmers for the additional costs they bore as a result of the protection for our manufacturing sector. Assistance to agriculture was financed out of the taxes paid by the wage and salary earners of our manufacturing and services sector, completing the circle. Farmers bore the brunt of the political backlash against subsidies and nobody else was required to change.

These measures were responsible for the fact that our national income grew much more slowly than that in most other countries in the OECD. We slipped from close to the top of the international income scale to about 18th between 1955 and 1982/83. Not only did our incomes grow more slowly but so did our exports.

At the same time, our overseas debt and balance of payments grew steadily worse, and our currency was debased by inflation. International comparisons show that from year to year our average level of investment was virtually identical with the average for the other OECD countries and how investment levels were not to blame. Where there was a gross disparity was in the figures for efficiency of investment in New Zealand compared with efficiency of investment elsewhere.

Compare the growth of real gross domestic product with the change in gross fixed capital formation in the OECD countries and in New Zealand. Express this as a percentage. The inefficiency of New Zealand's investment activities over the period under review is quite clearly portrayed. For the OECD group as a whole, in the period 1963-1973, this ratio was 22.8 percent. In the period 1973 -1983 it was 11.77 percent.

For New Zealand, by contrast, in the period 1963-1973, this ratio was 18.7 percent and in the period 1973-1983 it was 5.8 percent. New Zealand's ability to produce growth of real GDP as a ratio of its gross fixed capital formation was below average to start with, and in the second period was cut to one third of its original level. Even compared with the low growth OECD economies, we still found ourselves investing far more and producing far less. New Zealand's ability to use its investment capital efficiently was low to begin with and declined in the latter period.

More market approach

In a very important book, in 1978, Ian McLean, now National MP for Tarawera, advanced the case for a much "more market" oriented approach to the determination of investment decisions in agriculture. He argued that this would lead to better investment decisions and improved incomes for New Zealanders.

Despite his election to Parliament in 1978, by 1984:

- Both import substituting industries and exporters were penalised by an overvalued exchange rate.

- Import protection penalised lowly assisted industries and pushed up cost for all exporters.

- Agricultural assistance was running at close to $1 billion a year, yet offset only partially, the costs imposed on agriculture by protection.

- The forms of agricultural assistance encouraged certain land users, particularly sheep meat production, relative beef production and the production of wool.

- Assistance to all sectors led to high budget deficits which in turn contributed to high levels of overseas debt.

The changes that have taken place in Government policy since 1984 have emphasised that agriculture's rightful place is as a normal part of the economy.

Prior to 1984 business decisions in agriculture functioned according to quite different rules to businesses in other sectors.

- It was assumed that people would enter the business with a low level of equity.

- Low equity entry could only proceed because of subsidised interest rates on the debt portion of the balance sheet.

- Assistance capitalised into land prices pushing up land values and it was logical to borrow against the equity gained through appreciation of capital values in order to maintain living standards and adequate levels of income.

- In a period of reduced income it was appropriate to respond by seeking Government assistance to maintain sufficient incomes, or by increasing production, or both,

rather than by seeking out new products, processes or land uses.

- The underlying assumption of New Zealand political life was that as agriculture was so important to the New Zealand economy, the Government would always be there as a back stop behind our major agricultural export commodities.

As early as 1981 in the proceedings of the Hill and High Country Seminar at Lincoln, Athol Hutton pointed out that agriculture was built on very false foundations "because we have allowed the price of our precious raw material (land) to get out of control". He pointed out the growth in the use of tax incentives designed as assistance to agriculture as tax shelters for non farmers seeking a means to convert taxable incomes into tax free capital gains. As a result of the growth in Government assistance from 1970 onwards, farm land prices moved significantly upwards and at a much greater rate than the consumers price index. Quoting Dr Sutch, he warned that subsidies or assistance to any farm input or output is immediately capitalised into land prices.

At a time when foreign trade ministers around the world were looking for excuses to deny access to their markets for New Zealand's principal export products, New Zealand had commenced a heavy programme of agricultural assistance. These measures gave our customers and competitors, a heaven-sent opportunity to accuse the normally self-reliant farmer of being heavily subsidised. They also changed the psychology of farming from rugged independence to a belief that the nation owed farming a living.

Where are we now?

In an article from Atlantic republished in "Dialogue", Greg Easterbrook points out that in the United States, the 1980 input for farm labour was a fifth of that in 1930. The input for machinery was three times greater and the input for chemicals 20 times greater. He wryly

points out that farm groups in that country say there is something wrong with the fact that wheat costs less in real terms today than it did in 1870. There would be something wrong if it didn't. The fact of the matter is that because of increased productivity in agriculture, the world is currently awash with food and prices are at an all time low.

Governments in the United States, Europe and Japan have tried to support farm incomes at the real levels of 10 or 20 years ago. This has led to expanded output using the most modern techniques. Production has increased to the point where the Club of Rome have been proven conclusively wrong. Contrary to the predictions of pressure by world population on food supplies and raw materials, prices for all commodities including food are at historic low levels and the demand for these products has collapsed.

This is what the Treasury meant in their "Economic management land use issues" document when they said in 1984 that two features applying to most of the traditional pastoral products are difficulties of market access and falling real prices. Despite the concentration of policy making on increased agricultural production, the changing environment in which land-based industries operated, both internationally and in the domestic economy, had already had its impact.

As a percentage of gross domestic product, agricultural production fell from about 10.1 percent in 1980 to about 7.1 percent in 1984. Many of the policy decisions were justified in terms of difficulties facing New Zealand's primary industry as a consequence of problems elsewhere in the domestic economy. This Government has endeavoured to direct policy making to solving the basic problems rather than seeking to suppress the symptoms as they appeared in the rural sector.

Policies to achieve these ends have included:

- Industrial Relations reform including the end of compulsory arbitration.

- Tax Reform including GST.

- Dismantling exchange and investment controls, phasing out import licences and tariff reductions.

- Removal of Government from the detail of economic decisions and focusing on its role as a rule maker.

- The commercialisation of whole chunks of the State Sector with massive financial savings.

As Sir Ron Trotter has pointed out in a recent speech on international trade, protectionism is like being in a smoke filled room. The very best thing you can do, for your own health, is to give up smoking. The next best thing is to try and persuade other people in the room to give up smoking as well.

Although protectionism in agricultural trade remains all pervasive, the intellectual battle on agriculture is won. Nobody now talks of food security, or says that reductions in protectionism should not be negotiated. The most hesitant now argue for breathing space and political space to move. This is a far cry from the climate only a year or two ago, when New Zealand had to fight hard just to have agriculture placed on the agenda.

Progress has been substantial in the group of seven economic powers of the Tokyo Summit, who addressed agriculture for the very first time. Thanks to the efforts of Mike Moore, at GATT, and Richard Prebble at the OECD meeting, agricultural trade is on the GATT agenda based on a report prepared by the OECD. Richard Prebble managed to shame the OECD into at least studying the issues that have been raised by New Zealand's reduction in protectionism.

One of the principal criticisms of the liberalisation policy that has been undertaken is the perception that there is no necessity for flexible exchange and interest rates to ensure adequate farm incomes. Particular attention has been given to the fact that interest rates have been too

high, leading to a dollar that is over-valued, thereby cutting farm incomes and disadvantaging the export sector generally.

It is my belief that this view is mistaken, because it is approaching the problem from the wrong way round. If it is accepted that New Zealand had to undertake an adjustment process, then I believe it must also be accepted that we would inevitably pass through a very difficult period for export industries. As I see it, the mechanism works this way. As we disengaged from a wage price freeze and controls over our banking and financial system, the potential was there for hidden inflationary pressures to come to the surface. This was added to, by the 20 percent devaluation on the election of the fourth Labour Government and exacerbated on October 1, 1986, by the introduction of the Goods and Services Tax. The whole process of adjustment is designed to reduce inflation without controls. It is not possible to reduce controls and simultaneously maintain direct control over inflation.

An essential component of the adjustment process, is therefore, allowing interest rates to find their own level. Having positive interest rates, that is interest rates above the rate of inflation, is absolutely essential to restore the viability of a capital market based on financial assets. Previously controlled interest rates provided an incentive for speculation in tangible assets. Inevitably, therefore, interest rates remain for a period, higher than is comfortable and the surprise is that despite our high interest rates, there has been a very great stability in our relative exchange rate. What has happened, of course, is that two major currencies, the Australian Dollar and the United States Dollar have depreciated substantially with respect to the New Zealand Dollar while other important currencies, particularly European currencies and the Japanese Yen, have revalued substantially with respect to the New Zealand Dollar.

The trade weighted and basket of currency indices have shown a remarkable stability in the period since 1984. It

is very easy for commentators to advocate massive reductions in Government expenditure to reduce interest rates, inflation rates and the exchange rate. It is not commonly realised that half of Government expenditure comprises debt servicing and social welfare expenditure.

Before political scalpels are sharpened for the social welfare budget, it needs to be pointed out that 50 percent of that is represented by national superannuation. The public reaction to the one fairly modest effort to curtail expenditure in that direction, shows why rhetoric is easy on the expenditure front but positive action is much more difficult. Reducing debt servicing is a goal which will be achieved only as improved efficiency in the economy turns into faster real growth and improved trade balances and investment flows.

Corporatisation of the public sector will progressively deliver expenditure reductions over the next five years. Nearly $2 billion has been cut from Government expenditure by this Government over the last two years. Such was the scope for improvement that much of the saving has been obtained by simply improving the quality of expenditure in reducing the proportion absorbed by the delivery mechanism.

The reviews currently underway in the social welfare, education and health portfolios will be of the quality improving type rather than representing expenditure reduction. If further substantial state expenditure reductions are contemplated, they will be accompanied by widespread staff reductions and withdrawals of state-provided services.

Where are we going from here?

The immediate market outlook for most of our major products is not particularly bright. Although the overall world economy is expected to continue growing, protectionism, particularly within the United States is growing, despite an official recognition of the damage that it does. Our major commodity trades in the meat

industry, dairy and arable sectors are likely to continue to be oversupplied although there is the potential there for providing specialist and segmented markets. In the event that the moves already underway to reduce production, produce positive results, we can look forward over the next two or three years to a firming in world prices although not much of an expansion in the total world demand for these commodities. Wool is in a somewhat different situation. World demand for wool continues to expand as a result of a growth in the OECD economies and the increased availability of wool and textiles in clothing in the centrally planned economies particularly China. Competition from synthetic fibres and cottons in terms of price and quality will intensify. However, given continuing product improvement and promotion, the outlook for wool remains reasonably bright.

Horticultural trade is expanding internationally much faster than all other agricultural trade. New Zealand is well placed to take advantage of this development. Our regulated pip fruit and kiwifruit sectors are demonstrating a high degree of competence and moves to encourage discipline in other horticultural sectors have recently been taken by Government. Our large growing forestry sector has a major challenge ahead of it, in marketing the immense increase in New Zealand's wood supply that is going to occur over the next 20 years.

Because virtually all countries have sought to insulate their land-based production from world market realities for strategic social and other reasons, the same themes seem to come through irrespective of the sector that one is addressing.

Accordingly, the policy response should be similar:

- The number one priority must be to use New Zealand's dismantling of protection as a lever to persuade our OECD partners to do the same in their interests as well as ours.

- The needs of the customer must be paramount in planning production in all land-based sectors, our industries must be market driven not production driven.

- Commodity markets will remain important but cannot be relied upon to provide an adequate income of themselves.

- The Northern Hemisphere developed industrial economies are a contracting market for the kinds of land-based exports we have traditionally traded.

- We must search out the many opportunities that exist in the so-called middle-income countries of South East Asia, The Pacific Rim, Latin America and North Africa.

The response by processors

The forces that have been released by the deregulation of transport, finance, labour and manufacturing sectors are leading to a rapid reorganisation in the meat industry. In two years meat has had to match changes which took 20 years in the Dairy Sector. The formation of fewer and larger companies must be seen as a positive development, as is the entry of Watties, and other companies engaged in the food business. The opportunity for entry of small co-operatives and specialised processing companies must be kept open. The labour force in meat will fall on the killing side and rise in processing.

The very substantial reductions in farm income and expenditure that have occurred in the last few years have put very great pressure on the meat industry to improve their performance as a means of helping to restore farm incomes. The farm end of the industry will change also. In the recent past many farm businesses were encouraged to increase stock numbers to the point where they placed their businesses in jeopardy because of the risk of climatic disaster and exposure to unfavourable prices and interest rate movements.

With a focus on increasing production at almost any cost, high input regimes were required to boost stock numbers, which again reduced the flexibility of the farmers' response to changed circumstances. Subsidies which reached a peak of $29,000 per meat and wool farm in 1982 enabled smaller properties to be farmed and still produce a positive net revenue and this position too has changed and these farms are in the throes of restructuring.

My view is that in the years to come we can expect that:

- There will be lower stocking rates with lower levels of farm inputs.

- Farmers will develop and apply lower cost management regimes with more emphasis on natural methods of income production and income stabilisation.

- The average size of properties will probably increase but the capital input required will reduce as farms have more realistic values in relation to the value of production obtainable from the land.

- Farmers will be encouraged to have a more diverse output mix including deer, goats, horticulture, fodder trees and other income earning possibilities.

- Farmers will also develop more diverse investment portfolios with the possibility of different forms of ownership of the business including syndication, trusts, partnerships and other techniques designed to maximise the input of business expertise and the commitment of the traditional family farmer.

- Political power in the rural community will shift to women and the innovators from those concerned solely to defend the status quo.

Women have played an important role in coping with rural change. While men frequently have a less emotional

response to a crisis, there is no doubt that women's practical skills which were at one time restricted to domestic duties, have proven a vast untapped source of energy and leadership at a time of crisis. This leadership potential has begun to revitalise many moribund rural political structures and has begun to make its present felt at the national political level. Because of more realistic land values there has never been a better time for land settlement for potential farmers with reasonable capital. As this message sinks home, I would not be surprised to see, as new settlers, many traditional farming couples but also some highly qualified single women.

Conclusion

Many commentators and rural spokesmen sought to convince Roger Douglas and the Labour Government that the approach that it adopted from its 1984 budget onwards was mistaken, damaging and disastrous for rural communities. At one time the current Leader of the Opposition classed these policies as evil. Other MPs advocated civil disobedience. Federated Farmers, to its eternal credit, never joined this chorus of root and branch condemnation but throughout maintained the integrity of its own policy, a positive outlook, and sought to negotiate with Government over its different perceptions. There is now emerging a strong rural concensus that what the Government did from 1984 onwards was correct. In the Federated Farmers policy for 1987 election can readily be identified actions the Government has taken since 1984 and I had no difficulty endorsing it for the Government.

The recent announcement by the opposition of their agriculture policy indicates that they have rejected the approach of manipulating interest rates and exchange rates by Government pulling economic levers and have broadly accepted the same thrust that Government has been adopting. There is no doubt that there has been intense pain inflicted on some communities and some families. It has been made more acceptable by the knowledge that it is now not confined to the rural sector

alone and that freezing workers, car workers and public servants are undergoing major changes as well.

The real issue was, had the Government delayed, prevaricated or compromised on the overall thrust of its policy, thousands of additional young farmers, and potential young farmers would have been encouraged to place their savings, their businesses and their families at risk by investing in totally unsustainable business propositions. Considerable transitional assistance worth hundreds of millions of dollars, has been forthcoming from Government to enable the restructuring of farm businesses, producer boards, rural taxation and individual families' lives.

In an article in the National Business Review of 27 March 1987, entitled 'Facing up to farmings' deteriorating epoch', Geoff Pricket, a northern Hawke's Bay farmer, tried to provide the answers to two pertinent questions. These were asked in an article by the President of the National Union of Farmers of Great Britain, Mr Simon Gouley. In a broad survey of the prospects for world agricultural trade, Mr Gouley had advanced the argument that 'farming has got to be wound down'. He then went on to ask:

- 'Whose farming?' and;

- 'Who is going to decide?'

Geoff Pricket's answer to the second question was "the final arbiter will be the market place". His answer to the first question was "Marginal farming will go. Farming will be confined to the more productive and profitable land. The value of marginal farming and the land that goes with it will be reduced. Sometimes to zero". The article maintains that attempts by individual nations to protect specific industries have generally ended in failure and even if apparently successful, these attempts have contributed to the overall economic decline of the economy that offers protection. Geoff Prickett concludes

that it may be hard for politicians to accept but their economic power has been greatly reduced.

A combination of modern communication technology in the very much greater diversity and complexity of business structures has meant that nationally applied simple guidelines, regulations and decrees, are obsolete and the hindrance to the development of the business they once sought to promote. Power has inevitably shifted to the market place, in particular the international market place. Potential investors in rural businesses, whether they be horticulturists or high country sheep farmers, must start their business planning at the market place. That must determine the plans they lay for processing their product, transporting it to the place where it will be processed and ultimately determine the management system they apply on their farm.

The ingenuity that we once sought to apply to protect ourselves from change must now be devoted to adapting to change. Even in a part of our country as apparently timeless as the high country of the South Island, information from the world market place must be used to formulate sound plans for the future.

Commentary

Emeritus Professor Sir James Stewart*

Some of the matters raised by the three presentations lead me to question whether it was necessary for our industry to go through the experience and trauma which it has without having first noted some of the lessons that might have been learnt elsewhere; that is before we necessarily went down the pathway we took with such haste and maybe such imbalance.

Mr Butcher said that without pain there would have been no change. That's an important hypothesis; I am not sure that it's widely provable, but I know that it is a view held very strongly by him and some of his colleagues, whose firmness and inflexibility has to be admired, but can also be very concerning. About three years ago two very significant visitors were in N.Z., one I understand at the invitation of the Treasury. They gave opinions which were noted very much at the time but, as far as I know, have not been referred to for some time. I want to quote from at least one of them whose views are very central to what we have been talking about in this session.

Professor Aldo Dadone, Professor of Economics at the University of Cordova in Argentina and previously a central banker, referring to agriculture's ability to survive in a market economy said "Without doubt, when all the distortions have been removed, it can, but the trick is timing and sequence". The main trouble he said, is that of an appreciating exchange rate. "If a country starts a liberalisation programme by (a) removing financial and exchange controls, and (b) eliminating export subsidies,

* 'Sonning Farm', Halswell, Christchurch.

and if this is done before (a), the fiscal deficit is cut back to zero and (b) the reduction in protection to the importable goods sector becomes really effective, then probably the following chain of events will occur. If the government borrowing is in the internal financial market the rate of interest will rise, this will attract foreign capital, and will increase the exchange rate. Hence it will lower the relative prices for the agricultural sector. Compared with the trend of agricultural prices the rate of interest will be unbearable for the export oriented industry."

Visiting about the same time, Ann Krueger, the very distinguished Vice President of the World Bank, speaking in New Zealand on economic liberalisation experiences in other countries, concluded that "failure to maintain the real exchange rate during and after liberalisation is almost a sure fire formula for major difficulties, and the defeat of the effort. The reason for this is that a liberalisation effort aimed at opening up the economy must induce more international trade. It is not enough that there may be more imports; there must also be more exports. Since the exchange rate is the most powerful policy instrument with which to provide incentives for exporters, its maintenance at realistic levels which provides incentive to producers to export is crucial to success." I understand that in a subsequent exchange of views with Treasury officers Vice President Krueger agreed that allowing the exchange rate to float freely could be a self-correcting method. If this is the case, then the lesson yet to be learned in New Zealand is what is the length of the time lag, and the depth of the damage before stability is achieved. So what are the lessons about the damage to the industry? Each speaker, in a different context referred to them.

First of all I want to talk about the human cost. It is something that I am very conscious of at present because of involvement in the Rural Bank discounting scheme. I would not attempt a value judgement as to whether the damage to a young farmer losing his farm is greater than that to a coal miner who loses his job through the

re-construction of the coal industry, or the freezing worker at Whakatu, who becomes redundant. All I can say is that a lot of first class young people, technically skilful, enormously industrious, but caught in the trap of land values fuelled by the expectations of inflation, and encouraged in a very positive way into high cost development with lengthy time-lags to pay-off; facilitated by liberal lending far beyond the stringent criteria recommended today by Mr Dewar; encouraged by farm advisors, university professors, accountants; who have lost not just their livelihoods and their homes but their faith and their spent sweat. How many? There have now been 7,000 applicants for Rural Bank discounting, 3,800 of these have been processed of which nearly 30 percent have been declined. How many non RBFC people are in similar situations? Although the Rural Bank was a very massive lender it holds only one third of the total debt in New Zealand farms. If the Rural Bank's discount package does nothing else but hold off the flood of mortgagee sales (which in itself will most gravely exacerbate the whole problem) it will be justified. But the number hanging on by the thinnest of threads, even with the discounted package, is quite substantial. We have yet to research what has been happening to the 30 percent that have been turned down. Those hanging on by a thin thread are still in a highly vulnerable position. Only a sharp decline in interest rates and a real improvement in terms of trade (which Mr Butcher doesn't seem to be very optimistic about) will enable many of them to survive and maintain their farms. Incidentally, in terms of human cost, spare a thought for Rural Bank staff who are going through, I think one of the most traumatic periods in their professional lives.

Together with the personal costs, there is a real social cost. The decline of the rural heartland, as the Listener put it so eloquently two or three weeks ago, is unlikely to disturb very much the 80 or 90 percent of N.Z.s population who are not directly involved. But what lessons do we learn about the economic costs and benefits of the impact of the free market? Mr Butcher described the benefits as he perceives them, and he has a strong belief

in them as they were enunciated by Treasury in 'Land Use Issues', to which he referred. Many of the arguments are of course irrefutable; everyone now understands that New Zealand cannot afford to be non-market responsive. But I would put it to you that one or two issues are contestable. The first one refers to land values, and the hypotheses that the capitalisation of support measures was the critical element in the great lurch upwards in land values in the early eighties. However research here at Lincoln has cast doubt on this simple hypothesis. It showed that of the complex variables which impact on land value, that is not necessarily the most powerful one. After all dairy farm values went up at the same time and there weren't high levels of SMPs for the dairy industry. It was a world-wide phenomenon; it was fuelled by expectations of inflation. The proposition that support measures were the predominant factors in escalation of land values needs a good deal more clarification. Moreover I would not regard Dr Sutch's economic philosophy as one to which the country would want to conform - when so much of that philosophy was responsible for the two-tier economy in which we found ourselves prior to 1984.

Furthermore, I put it to you that the financial crisis in farming at present must be seen in a much wider context than land values; after all only a small percentage of farms change hands each year. The escalation of costs beyond the farm gate, has been the most damaging factor. For example the farmer share of lamb value decreased from over 60 percent to under 20 percent in a few years, reflecting, perhaps, the failure of the meat industry to adjust to the reality of change, more than the failure of farmers to adjust to the situation in which they found themselves.

Secondly, I want to question the argument that farmers brought on their own crisis by over-production. I would like to suggest that undermarketing would be as significant as overproduction.

The conventional wisdom followed by Treasury and Mr Butcher is that we need to move on to a lower production curve using lower inputs and "more natural methods of production", which I presume means less fertiliser and chemicals. The argument produced by Treasury in 'Land Use issues' was the classical marginal revenue argument; that we had gone too far with production, and were on a declining marginal revenue. But Bob Engelbrecht questions this solution to farmers' problems. You all know what's happened to the phosphate bank, and Bob Engelbrecht has properly pointed out that research has very clearly demonstrated that the cost of replenishing the phosphate bank (which we used to say was the most important bank in the country), and the cost of weed reversion, the whole cost of disinvestment is properly a matter of deep concern.

Disinvestment is happening and the results are emerging. Lamb production is down in two or three years, from 39 million to 32 million and it is notable that the marginal revenue argument hasn't applied. The value of a lamb carcass this year is no more than it was three years ago. With wool we are down from 380,000 tonnes to 355,000 tonnes I think and Mr Morrison (the Chairman of the New Zealand Wool Board) made it quite clear recently that if we hadn't been down that much we would have earned another 130 million dollars of foreign exchange. In that context the retrenchment doesn't seem to me to be terribly good economics.

We applied the same quantity of fertilizer last year as we applied in 1960-61 but we've got 44 percent more stock units. So are we 100 percent confident that we are not allowing the most important resource base we have to run down in a costly way? Would it not have been wiser to have put in some economic buffers while we got the deficit, interest rates, and the exchange rate right, as the industry can not be turned on and off like the kitchen tap. If you are confident about a market upturn, and I am, if you believe that the tide of protectionism is turning, and I am, if you believe that we

still have to exploit the potential of the near north, China, Japan, Indonesia, South Korea, Singapore, Hong Kong, and the Pacific coast of the Americas as I do, then you would have to be concerned about any major reversion of our pastoral and agricultural resource. Commenting on the same matter, Hugh Fletcher has asked "how long can you go (with disinvestment) before you are doing more harm than ultimately you might do good? You get into a downward spiral that you can't pull out of. That still has to be a worry."

So, what are the lessons from today's papers? From Mr Butcher, that the present policy is clear and fixed, and that there is no case for any interferance with the market mechanism even in the interests of resource maintenance.

From Mr Dewar, the lesson of the essential virtues of lending and borrowing on a proven and rigorous basis, the principles of which were often neglected, by both borrowers and lenders in the heady days of the 70s and early 80s.

From Mr Engelbrecht, the relearned principle, that survival for farmers in the present environment is entirely a matter of self dependence.

Lance William McCaskill: A Tribute

Emeritus Professor Kenneth B. Cumberland*

I am proud to have known, and to have been a friend of, Lance McCaskill over a period of almost half a century.

Today I am privileged and honoured to have been invited to deliver the first McCaskill Memorial Lecture, and to pay to Lance McCaskill a modest and, I am afraid, quite inadequate tribute.

I have long owed him a deep debt of gratitude not only for the pleasure and profit our friendship brought me - particularly the help and assistance I had from him when I was first exploring New Zealand almost fifty years ago - but also for the indirect benefit I have derived as a New Zealander from his work, more especially in conservation, and from his rich and diverse contribution to the nation as a whole.

It is 49 years last month since I first met Mac. I no longer remember the specific occasion. But at that time he was one of half a dozen lecturers at the Christchurch Teachers' College to whom I was introduced by my new boss, George Jobberns. For some years George had been Mac's colleague at the teachers' college until he moved over to teach geography full time at Canterbury University College. The other members of the teachers' college staff I remember meeting in my first few weeks in New Zealand were George Guy, later the college principal; Walter Harris, later audio-visual aids officer with the Department of Education in Wellington; Archie Campbell, later principal of the Ardmore Teachers'

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College and longtime Mayor of Papakura; and Jimmy Masterton, a tart and touchy Scottish teacher of art.

I regret the fact that my own career took me to Auckland after only eight years in Christchurch, with the result that, after I joined the drift to the north, my friendship with Lance McCaskill had perforce to be conducted at a distance, apart that is from the occasional meetings we enjoyed at conferences and at professional gatherings of one sort and another. It is, then, from my time on the staff of Canterbury University College, and while Mac was still at the teachers' college or had, in 1944, just taken up his lectureship in rural education at Lincoln, that my contact with him was closest. Fortunately I have subsequently made frequent, if irregular, visits over the years to Christchurch on which I always tried to look-up both George Jobberns and Lance McCaskill if only for a few minutes chat, or exchange of news. More especially after Mac was widowed, and he moved from Clifford Avenue to Kauri Street, and close to another of his lifelong loves - Riccarton Bush - I tried to spend a little time with him.

It follows, I think, that what I can best do today is to speak about Lance McCaskill as I knew him both in his, and the century's, late thirties and forties, when many of you may quite well not have been around to have known him in his fighting trim. In more recent times, on the other hand, you all probably saw much more of the man and his work than I was fortunate enough to do.

My closer association with Lance McCaskill covered, of course, the years of war and brief periods of peace at either end of it. They were years of excitement and exhilaration, of depression and disappointment. Mac, I imagine, occupied a responsible post reserved from overseas service; he served, however, for four years part time in the local emergency defence forces. I was caught up in the first ballots for both home and overseas service. I was rejected, though, on medical grounds, as well as on appeal by Canterbury University College, especially in view of the fact that the only other member

of the departmental staff was on overseas leave. So I was fortunately able to get on with my job, and to face the prospect of doing serious research, no matter how adverse the circumstances.

Those war years were also years of shortages. Petrol was heavily rationed. Travel within New Zealand was difficult. Trains were crowded. The first time I travelled on the North Island Main Trunk line was from National Park to Wellington. I had to sit on my case beside the lavatory door all night. That was in February 1944; and I was travelling under the auspices of the Department of Public Works and the Soil Conservation and Rivers Control Council, but paying my own way.

They were years of austerity in other respects. Universities had no research funds: teachers' colleges had less. University departments, other than physics, chemistry and biological sciences, had little, if any, equipment. When, in 1946, I had the task of establishing a new Department of Geography at Auckland University College, with a first year enrolment of 210 students - most of them established teachers or returned servicemen much older than I was - I was allocated an initial equipment grant of twenty five pounds! I had to beg the topographic maps I used; and, having acquired them, had to find room for them in my office which itself I shared with two lecturers in English. And I had to carry the maps in a thick roll on the tram each time I held mapwork classes, three times a week, in vacated American army huts, in Hobson Park, Remuera.

I mention this from my own experience of that time -and I hope you will excuse me - to give you some idea of the economic, social and academic environment, so different from that of today, in which Mac was working when I knew him first, and when he initially made his mark in the community.

I think it is also important in considering and assessing Lance McCaskill's work in those days to get another matter into scale and proportion. 'Conservation',

'environment'. 'ecology' and 'pollution' were, in the 1930s and 1940s words you might have been able to find in one or two research papers, occasional advanced textbooks and trendy editorial columns, but not in newspaper headlines, nor in any legislation, and certainly not on the tongues of politicians, or in their election manifestos.

The conservation movement, with its thousands of ardent, active protagonists, and the political clout it exercises today, which we accept as normal and legitimate, was fifty years ago the concern merely of a handful of individuals, of a smattering of mild cranks and gentle protestors. In New Zealand, most of them, I believe, were in Christchurch. Auckland had only one that I heard of. He was W.R. McGregor whose lonely single-handed battle finally saved Waipoua Forest. Wellington housed the head office of the twenty year-old Forest and Bird Society which from time to time issued muted conservation pleas. It was also the place of work of one or two government scientists treading carefully the treacherous path, between assuring their personal advancement and promotion, and revealing their real feelings and concerns over the destruction of indigenous vegetation and the plundering of soils. In Christchurch there was Mac, fearless and outspoken, but not quite alone.

To obtain a true perspective of Mac's endeavours, it is also pertinent to remember that when the war broke out in 1939 New Zealand was still a very small country. It had barely half the population it has today. It was half a century closer to the pioneering phases of its development which were still viewed popularly with pride and reverence. Active participation in the transformation of its indigenous landscapes had been the role of many of the older people in the community. Memory of it was fresh in the minds of many more. Banks Peninsula, for example, was still widely littered with logs and stumps. I recall clambering over and between them not only with Mac, examining slips and slumps in deep loess, but also with Peter Sears, the bright young man in the Grasslands Division, then doing his M.A. with me in geography at

Canterbury College, on the role of cocksfoot* in the country's livestock rearing economy. To get to Cass, or Arthurs Pass, by road you had to ford a score of creeks and rivers, and frequently your journey came to a grinding halt in axle-deep shingle and ice-cold water. The backblocks were indeed isolated, and a journey by road, and off the main highway, still an exciting adventure. For every seven vehicles on the road today there was only one in the 1930s. Mac had no car, I had nothing more than a pushbike for another decade.

I very soon discovered and learned to appreciate Lance McCaskill's depth and spread of reading about, and his grasp, mastery and understanding of, New Zealand's flora and fauna, his fund of detailed knowledge of the regional variety of New Zealand agriculture and his intimate acquaintance with, and first-hand experience of, so many different parts of the country. From South Auckland, Taranaki and Wanganui to Otago, he had been either an itinerant teacher of agriculture and science or a teachers' training college lecturer and an acute observer of his surroundings. The bicycle that took him from school to school on the Coromandel Peninsula, for example, and across the Hauraki Plains was not only essential to his job but enabled him to exercise his observational skills and his facility for acquiring knowledge of the countryside, to build a familiarity with its natural resources and to obtain an insight into the lives of the people on the land and the problems they encountered.

I was given the job at Canterbury University College - though, after only a few months' residence, I was still virtually an alien - of preparing a third-year course on the geography of the Dominion for delivery from 1939 on. No one had done so before. Both George Jobbers and Lance McCaskill were to leave New Zealand for North America early in 1939 on Carnegie Travel Grants. It was transparently clear to me that, before their

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* Cocksfoot was still being harvested by sickle on roadsides on Banks Peninsula during, and for some years after, the passing of the Great Depression.

respective departures, I had to tap and to quarry that lode of rich, incomparable and assorted knowledge about New Zealand which they had jointly amassed and accumulated. Between them they seemed to know just about every part of the country and, to my even greater astonishment, to be on first-name terms with just about everybody in it -certainly with everybody who counted for anything. That was measure in part, I suppose, of the diminutive size of the country. To both Jobberns and McCaskill, I was soon to be deeply indebted.

George Jobberns did have a car. It was a little black Ford 8 - horse power, that is, not cylinders. It had cost him one hundred and forty pounds in 1936, new! And New Zealand Railways ran excursions at weekends to Arthurs Pass, to Sheffield, to Waipara and to Little River. On many trips by road or rail - to Banks Peninsula's eastern bays, to Akaroa, Cass, Arthurs Pass, Waipara, Oxford, Hanmer - usually with students, Mac came along, and I stayed close to his shoulder to benefit from the steady stream of information about the vegetation, vegetational change, the pattern of land use and the use and misuse of resources, all of which flowed so naturally, so easily, in such a modest, matter-of-fact manner from his lips. His voice was so authoritative, his diction so clear, his choice of words so disciplined and precise, that it was easy to listen to him and to learn from him. It all emphasised that Lance McCaskill was above all a teacher, and remarkably expert at his job.

I don't think it was by Mac that my interest was first inclined towards the study of soil erosion, although I am sure that I owed to him my enthusiasm for understanding the history, nature and extent of the transformation of the relatively little disturbed indigenous vegetation of New Zealand into an almost completely alien cultural vegetation. I was astounded at the speed and ruthlessness with which the immigrant pakeha culture had proceeded, and at the amazing successes and stark failures it experienced. Mac had the whole story at his fingertips. What he did not have, and was unable to point to, was a map, a cartographic representation of patterns and

conditions 'before' and 'after'. That was just the job for a geographer.

I do recall that my personal interest in soil erosion was very soon to be deepened and focussed as a result of spending my first long vacation on a North Island hill country sheep and beef-cattle breeding property at Parihauhau, ten miles from Parapara between the Wanganui and the Mangawhero tributary of the Whangaehu, in 'impossible' papa-gorge country shaped and disfigured by slippage, slumping and flowage, both natural and man-induced, both ancient and deep-seated and recent and superficial. To me, fresh from the gentle green downland and unchanging heather-clad uplands of England, it was unreal, unbelievable. I was fascinated. It was my nascent interest in distinguishing the separate roles of nature and man - both maori and pakeha - in the moulding and modifying of the surface of the land itself that reinforced my friendship and association with Lance McCaskill, and especially after his return, late in 1939, from the United States of America and his studying there of soil erosion and soil conservation with the help and guidance of the USA Department of Agriculture Soil Conservation Service.

In the Department of Geography we conducted third-year vacation fieldwork courses at the Canterbury University College field-hut at Cass. Mac, ever ready to assist, came along with us at first. It was from him that I had my first real introduction in May 1940 to the high country, to the tussock grasslands and to the operation of high country runs (David McLeod's Grasmere-Cora Lynn and J.K. McAlpine's Craigieburn). And it was on our way back from Cass in George Jobberns' Ford 8, that we stopped off at Castle Hill, and Mac introduced us to what was to become another of his great loves - Ranunculus paucifolius. I remember the depth of his interest already in the preservation of the Castle Hill buttercup then barely surviving in the continental climate of the little, elevated, desert basin enclosed by bare Tertiary limestone escarpments, up behind and beyond the homestead. Five years later Mac was to assume almost sole responsibility

for the prevention of the buttercup's otherwise almost inevitable extermination.

While he was in the United States in 1939, George Jobberns persuaded a Ph.D. student of the redoubtable Carl Ortwin Sauer to spend two years at Canterbury University College as temporary lecturer, and to do fieldwork in New Zealand for his doctorate thesis. He was Andrew Hill Clark. The outcome of Andy's fieldwork and four years library study was the volume "The Invasion of New Zealand by People, Plants and Animals", a work that is less well known than it should be. Andrew Clark went on to become Professor of Geography at Rutgers University and later at the University of Wisconsin. He, too, owed a great deal to Lance McCaskill.

In the August-September vacation of 1940 George Jobberns, Lance McCaskill, Andrew Clark and I conducted a mid-winter expedition of the southern part of the South Island. I wrote, and still have, a detailed account of our day by day adventures and observations. Andrew Clark, interested in the historical-geographical origins of the contemporary New Zealand landscape, and I, now seriously involved in writing about vegetational transformation and about soil erosion, could not have had better-informed but still naively-curious guides and companions than Jobberns - geologist and geomorphologist and McCaskill - biologist and agriculturalist.

We had a little car and had begged and hoarded petrol coupons enough to get us to Southland and back. Lance McCaskill was at his very best on this trip, the expert teacher in the field with a small group of 'students' intelligent and mature enough to make suggestions and to argue about the processes surrounding the facts that landscape revealed, or which their own earlier experiences, in Europe, North America and New Zealand provided.

The first day we travelled from Christchurch to Naseby, all the way from an unusually early spring back into a hard and frosty winter, examining sheet and rill erosion

on the plains and in the North Otago downland on the way. Naseby, much more recently revitalised by Dunedin holiday-makers and bach-owners, was then a ghost town of delapidated, tumbling structures of tin and clay and unpainted wood. Its damp and muddy roads froze over as the sun plunged abruptly from the cloudless sky and in the few minutes it took us to discover whether any of the three pubs, still boasting faded signs, was in fact occupied and open for business. Jobberns swore there used to be 25 pubs in the town before gold ran out, and that as a young man in 1919 he had personally counted ten. Since then Ranfurly had taken over Naseby's administrative functions leaving the former Maniototo county town to broom, gorse, rabbits, abandoned sluicings and rusting water mains.

Next day between Naseby and Cromwell we explored Loenard Cockayne's 'man-made desert' on what in my notes I called 'the scabby, rocky, rabbitty Raggedies', its surface, between schist tors, half covered in scabweed cushions and rabbit muck, the other half with a frost-lifted, frost-loosened soil like a recently worked seedbed with only occasional isolated plants of sorrel, storksbill, red moss and hard-punched tussocks of Poa colensoi and P. maniototo. We photographed incipient rills and gullies etching their paths deeply between undermined cushions of scabweed and moss. Even in the fresh breeze, the desert air reeked with the pungent smell of rabbit droppings and urine. In Alexandra 'farmed' rabbit skins were fetching twelve pounds fifteen shillings a hundred, more than half a crown apiece, but we bought eggs there at fifteen pence a dozen, bread at three pence a loaf and petrol at seventeen pence a gallon.

From Cromwell we travelled right through to Tuatapere. But before we left the Clutha-Kawerau high terrace where they have recently built a new Cromwell, I remember Mac photographing tussock regeneration between the metal highway and the rabbit fences bordering the road. Beyond the fences were scabweed, lichens, hairgrass and diminutive hard-grazed but scattered

tussocks, and a third of the surface bare, frost-lifted and wind-blown. But inside the fence, beside the road, and relatively free from grazing by either sheep or rabbits, there was a flourishing cover of Elymus rectisetus (blue grass) assuming a knee-high tussock habit, with cocksfoot and goose grass.

At Tuatapere we investigated a pioneer fringe where, close to the town, with its new houses, pastures were being sown after ploughing between the stumps of the native bush which all around was being felled for timber. The previous century's processes of landscape transformation were still in operation.

Next day, after studying the prime grazing land, the dense flocks and swede crops of the Southland Plains, and after sampling Bluff's oysters - they were six shillings a sack! - we travelled through the Catlins. Strangely, neither Jobberns nor McCaskill had travelled before through the isolated hill-billy country between Tokanui, Chaslands and Owaka. I recall Mac's enthusiasm for the rather peculiar combination of forest species, the speed with which abandoned pasture was reverting to wineberry-fuchsia second growth, the widespread occurrence of tutsan (Paepericum), ribbon-wood and Cassinia; and the geographers' surprise at the almost total abandonment of small farms to scrub and second growth, the deserted hutments, the scatter of unshorn, 'doubledecker' sheep in the scrub, and the several horse-drawn buggies carrying whole families along the so-called 'road'.

That day took us as far as Millers Flat. There Mac and I were up at first light next day to inspect some 20-foot deep potholes and still deeper underrunners we had spotted the night before. They were on the steep slope behind the pub. It was mantled in clay-silt material of mixed residual and windblown origin. Its surface was now occupied by four-inch long ice crystals each capped with frost-heaved topsoil. Later that day we crossed our outward route heading this time from Cromwell for Lowburn Ferry. We spent the evening in the company of

the Middletons at their homestead on the Northburn Run in serious and interesting conversation about rabbits, rabbitters, duststorms on the river terraces and the face of the Pisa Range, about 'guts' and 'gutters', and about the deterioration of the native grasslands.

Next morning, again in bitter cold, Mac, Middleton and I were away early to have a look at Leonard Cockayne's tussock plots fenced off from sheep and rabbits in 1919. Twenty-two years later, they were occasionally grazed. However, they still demonstrated the vitality of the tussocks and their capacity to reassert themselves under controlled rotational grazing and, with aliens like oatgrass, cocksfoot and lucerne, to provide inviting lunch-time shelter for musterers from the fierce nor'wester and the stinging dust and rock fragments it sometimes carried. Outside the plots, by contrast, there was a rock desert with only scabweed, moss, lichens, sorrel and the tough little maniototo poa.

We returned to Christchurch via the Lindis, the Mackenzie, the South Canterbury downland and the upper, inner rim of the Canterbury Plains, where we examined and photographed numerous examples of rills cut down to the pan or the ploughsole in new-sown wheat paddocks, and layers of topsoil piled against gorse-bank hedges or spread through gateways and across shingle roads as a result of 1941's heavy winter rains.

That expedition cemented not only my friendship with Lance McCaskill but also our close association in the study of soil erosion in New Zealand, our endeavours to secure appropriate recognition of its ecological and economic significance, and in promoting and pushing the need for legislation that provided for soil conservation as well as river control. Bob Semple had already ordered his officers in the Department of Public Works to produce a rivers' control bill, and the war had been declared by the Canterbury Progress League, prodded by McCaskill, to have the scope and concept of the proposed legislation widened.

Mac himself has outlined in "Hold This Land" the history of the struggle he conducted, the battle he fought in 1940 and 1941 to secure the passage of a bill that would also embrace soil conservation and improved patterns of land use as well as stopbanks, levees, groynes and other engineering structures to hold rivers within their banks and to constrict them to their accustomed courses. It must have been difficult for him, as the principal protagonist, to write that story. His account is modest, brief, prosaic. It does not reflect the excitement, the constant pressure and the endless manoeuvres involved, or the tireless energy and tenacity demanded. Only one or two of the many illustrated lectures he gave, or of the meetings of local bodies and of the Progress League that he addressed, are referred to. There is nothing of the argument Mac and one or two others conducted in the correspondence columns of the "Press", of the many clubs and societies they addressed, of the radio talks and debates they planned and organised, or of the pleasure they derived from the fight. Tribute should indeed be paid to the "Press". Soil erosion was little understood at the time. To 'conserve' was still to make jam or marmalade. The environmental movement was no more than a feeble babe in arms. The "Press", though, was ahead of its time. It had a most enlightened editorial team - Hugo Freeth, John Schroder, Leicester Webb. In wartime, newsprint was precious, space at a premium. Yet the "Press" found room for letters running sometimes to a column length of fine print on an argument we conducted with a landowner at Montalto called Morrow who would have nothing of soil erosion because in his view the sole cause of tussock deterioration was tussock insects.

The Anzac floods of April 1938 and the spectacular and disastrous flooding they brought to Hawkes Bay, and especially to the Esk valley, won over both the engineers and the general public to the urgent need to prevent flooding by harnessing rivers and constructing expensive engineering works. But it was not the Hawkes Bay floods; it was rather L.W. McCaskill, then a little-known teacher of teachers who succeeded in broadening and

extending the outlook and ideas of sufficient engineers, politicians and members of the public, and who persuaded the legislators to enlarge the scope of Bob Semple's bill. If disaster brought the country to undertake the control of its rivers, Lance McCaskill almost alone persuaded the nation to safeguard its soils.

But soil conservation was not McCaskill's only concern, nor its embodiment in legislation his only achievement in the 1930s and 1940s. His chief and enduring commitment was to teaching. As a result of the contraction of teacher training, enforced by economy measures during the mid-1930s depression, the Dunedin Teachers' College was closed, and Mac was shifted to the Christchurch college as lecturer in biology. There, I am sure, his teaching was direct and successful. His manner was incisive, and his discipline, I'm informed, harsh. His special interest and joy was fieldwork, and he organised countless field trips taking advantage offered by cheap New Zealand Railways day-excursion fares. His students may not have loved and adored him, but at least they all had a deep respect for his knowledge, his teaching skills and his fairness. His forthright criticism of their work did them no harm, but it did not always enthral them or endear him to them.

In 1941 Mac's children were still at school. Ian was first, and early, to leave home, when he decided to seek his career in the merchant navy. Murray became a student of ours in geography at Canterbury College, and a good one, too. He is now Professor of Geography at the Flinders University of South Australia. Margery was a charming and retiring young lady in very much the same mould as her mother. It was Mac's wife Isobel who saw to all the family's needs. At home in Clifford Avenue Mac's time was short and precious. It was given over largely to another of his constant loves, his garden. It ran down to the bank of the Avon. It was both immaculate and unusual; immaculate from the care bestowed upon it, unusual for its assembly of native, especially alpine plants, like Leonard Cockayne's own New Brighton garden. Mac had many of the tussock grassland

species there, too. They grew in the shadow of the house itself. I never once caught Mac actually at work in his garden, but it must have demanded every second he could possibly spare. Later in Kauri Street, he had more time for his now tiny garden, though he at this time also had Riccarton Bush to supervise.

Correspondence, too, must have taken a great deal of his time - correspondence with departments of state, with Public Works, with N.Z. Railways (over the native plant gardens on railway property at Arthurs Pass), with the Department of Lands, with botanists and zoologists and conservationists in New Zealand and overseas (many of the latter scientists of international standing). In later years the correspondence he conducted in his endeavours to save the tarns and their plants at Arthurs Pass from the roadbuilders, and to preserve the Castle Hill buttercup from extinction was in each case of daunting and monumental proportions.

His letters didn't always win him friends. They were not always answered. They were, however, indispensable weapons in the battles he fought. It has been said that Lance McCaskill 'revelled in controversy'. That, though, is not my impression. He certainly did not shun or avoid controversy. But he didn't seek or welcome the unpleasantness it brought. If authority, or stupidity, or obstructive disinterest stood in the way of conservation, he did not hold aloof, or eschew conflict if it was unavoidable.

He often encountered obstruction, and found enemies in government departments. He could not tolerate a barren, unimaginative officialdom. He would not brook apathy, inertia, or wilful sabotage, on the part of officials. He could not abide what he called 'political skulduggery'. One of his more pervading aversions during the fight for the recognition of the menace of soil erosion was the attitude of the Department of Agriculture. In a recent issue of the Institute's "Review" you will find the following statement: 'It has been facetiously suggested by a pedologist (who probably wishes to remain anonymous)

that soil fertility ..... could be best increased by eroding subsoils as well [as nutrient-rich topsoil], exposing the C horizon material from which more fertile young soils could form'. The author of this statement probably little realised that this was precisely the official view of the Department of Agriculture in the 1930s and early 1940s. It was a view frequently advanced by its officers, and seriously, not facetiously.* Soil must erode to renew its mineral content and fertility, an allegation swallowed hook, line and sinker by even a Royal Commission on the Sheep Farming Industry (1947-1949). It was his caustic and outspokenly critical opposition to such views that earned McCaskill enmity and opposition in many quarters. As a result we were, more than once, shown the cold shoulder of Department of Agriculture field officers, on whom we called for help and information, on our southern South Island expedition.

In his period of service at the Christchurch Teachers' College, Mac also found time for extending his teaching beyond the bleak stone walls of the college buildings at the corner of Kilmore and Montreal Streets. He followed the publication of a series of brief articles on New Zealand trees and insects in the Dunedin "Evening Star" with a more comprehensive and beautifully illustrated series of 'Nature Notes' in the "Press" in 1940. And very soon after he left the college in 1944 to become lecturer in rural education at Lincoln, he edited, issued and himself often largely wrote the monthly "Rural Education Bulletin" until it was superseded by the first issue in 1961 of "Review: Journal of the Tussock Grasslands and Mountain Lands Institute" which he also edited and to which, after he had persuaded scores of

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*So the Department of Agriculture was able to inform the Canterbury Progress League in 1940 in answer to questions posed by McCaskill and sent to five government departments that 'erosion is not a problem calling for direct action', so that soil conservation was left to the somewhat inappropriate care of the Department of Public Works.

people both within and beyond the college to contribute, he often contributed valuable statements himself.

I suspect, and I would certainly like to believe, that Mac was inspired to produce and to edit the first at least of these periodicals as a result of the success we had in first producing the "New Zealand Geographer" whilst the war still raged and in the year before the "Rural Education Bulletin" first appeared. Mac's son, Murray, was later editor of the "Geographer" while Mac himself was editing and supervising the publication of the "Review".

Among the other manifold activities and causes that Lance McCaskill's boundless physical and mental energies enabled his heart, his courage and his enthusiasm to pursue in the 1940s was his broadcasting; his public addresses; his initial interest in, and promotion of, national parks; his ardent support of, and assistance to, the Young Farmers' Club movement; the earlier part of his active membership of the Forest and Bird Protection Society of New Zealand; and his services as a member and office-holder of the Canterbury Agricultural College Old Students' Association.

The establishment in 1944 of the North Canterbury Catchment Board, to which both George Jobberns and Lance McCaskill were elected, gave Mac still another avenue of continuing activity, another outlet for his vigour and zeal for the preservation and conservation of elements of the New Zealand environment. Now he had a more reputable, a more respectable, escape for his restless vitality. His membership of the board lasted almost twenty years, and it led later to his work as a member of the N.Z. Catchment Boards' Association and to his appointment to the Soil Conservation and Rivers Control Council. Mac was beginning to feel that he had arrived, that he had made it.

But when I knew him best, Mac was, I suppose a protestor, a stormy petrel, a renegade. And, I believe, that it was in that sort of capacity that he was at his best and most effective. At the time, to protest in

public, to make trouble for the establishment, to be out on a limb, to be a dissentient, especially in New Zealand which had not yet quite cast off its Victorian attitudes, was rare indeed. McCaskill's unhesitating, fearless criticism sometimes earned him only enemies. He had none of George Jobberns' smiling, gentle diplomacy, no fund of trifling jokes and long-winded personal reminiscences to fit every occasion, no gentle quip to put his opponents at their ease. In his forties he was not unlike a trial-winning huntaway with one fault. No matter how hard he might be thrashed and knocked back, he was still inclined to grab his quarry at times in his teeth, and to draw blood. Those who had felt the sharpness of those teeth were inclined to shun or avoid him. But such was his single-minded devotion to the just causes he espoused that he could never be ignored. He was always more than adequately informed. The breadth and depth of his reading, the variety and scope of his contacts with authorities in his fields of interest, and the diverse correspondence he conducted with them, were guarantees of that. His arguments were always based on fact, not on sentiment. But they were pursued with inexhaustible determination, with a terrier-like persistence and in clear and forthright language.

Yet Lance McCaskill was no petulant, peevish protestor. He was no blind and blinkered, or prejudiced and sentimental environmentalist as, unfortunately, so many of today's TV-promoted and emotive conservationists appear to be. Mac's success with practically every cause for which he battled came from his level-headed, down-to-earth, fact-founded advocacy.

It has been said that Lance McCaskill was no scientist. That may well be true. He never claimed, however, as far as I know, to be a scientist. 'I am a teacher', he wrote modestly. 'I rely for my information on the work of others'. Yet his powers of original field observation were as formidable as the best field scientists I have known. Mac was not afraid to use and to rely on the work of scientists. He was also critical of their work when he felt criticism was due. Indeed he sometimes had

a healthy contempt more especially for the work of narrow specialists who failed to comprehend and keep in view the basic problem whilst losing their way in what he considered the futile pursuit of minutiae*.

On the other hand, Lance McCaskill had an immense respect for pioneer field observers of the tussock grasslands like Buchanan, Petrie and Guthrie Smith, as well as for scientists like Cockayne, Zotov and Allan.

I have often wondered what Lance McCaskill might indeed have achieved had he himself followed a scientific career after taking his masters' degree in this college with first-class honours in agricultural economics, had he much earlier had a university appointment and the research facilities afforded these days to far less capable and less competent scholars.

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*McCaskill was a generalist and I doubt if he would have had much time, for example, for teams of scientists concerned to demonstrate that talus is a natural rather than a man-made phenomenon. No one familiar with the work of W.M. Davis or Sir Charles Cotton, and no friend and associate, for example, of George Jobberns could make such a mistake. I know of no one who ever 'blamed the widespread occurrence of shingle slides in the eastern Alps on early European burning and overgrazing, or on fires about 600-900 years ago ....' To Mac the only pertinent question was the extent to which cultural intrusion had accelerated or extended the movement of scree. (See I.E. Whitehouse, M.J. McSaveney and T.J. Chinn: 'Dating Your Scree', "Review 39", 1980, pp. 15-24). Nor would McCaskill have been impressed by the recent summary of the revelations from scores of specialist papers which are the outcome of a 'decade of intensive investment in research on high country erosion'. With one exception, all the conclusions are elementary and straightforward and were accepted half a century ago. (See I.E. Whitehouse: Erosion in the Eastern South Island High Country - A Changing Perspective. "Review 42", 1984, pp. 3-23.

With his ability, and his concern, and the added status and authority he would then have enjoyed, he would have been an even greater force in the land. And had he had access, as do so many of today's so-called environmentalists, to the limitless potential of TV, for which his voice, his manner and his teaching skills would so admirably have fitted him, Mac might well have been a figure to rank with Attenborough or Bellamy.

Unfortunately, I do not have the knowledge or contacts to more than draw even the roughest of outlines of the succession of distinctly different careers of Lance McCaskill after 1944 when he took up duties at Lincoln, first as lecturer and later as associate professor of rural education, then as foundation Director of the Tussock Grasslands and Mountain Lands Institute. Even in retirement he started a new and different career as an author, writing books on the history of soil conservation in New Zealand, on the story of Molesworth, on the unspoiled South Island, and on the country's mountainlands. I do know, though, that each successive career was crowded with diverse interests and ceaseless activity. It is to these later periods that belong his organising of Lincoln College Farmers' Conferences, his association with the Institute of Foresters, with the Forestry Development Council, the Association of Soil Conservators, his membership for twenty years of the Arthurs Pass National Parks Board and his appointment to the National Parks Authority.

Slowly at first, it started with the award of the Bledisloe Medal in 1944, honours were heaped upon him: the Loder Cup (1951), honorary life membership of a large handful of important organisations, the Fellowship of the Institute of Agricultural Science, the Associateship of Honour of the Royal New Zealand Horticultural Institute, in 1969 the C.B.E., in 1978 the D.Sc., honoris causa, and finally in 1984 the Sir Peter Scott award for conservation of the International Union for Conservation of Nature and Natural Resources (IUCN).

With each token of recognition, Mac mellowed. This I noticed especially, I suppose, since it was at intervals that I saw him. His circle of friends widened. His erstwhile enemies forgave his youthful exuberance and biting tongue. He became a figure of importance, influence, standing and respect.

Lance McCaskill was not the outstanding scientific authority of the scientist he most admired: Leonard Cockayne. Nor did he enjoy Cockayne's international reputation. He did not have the status, wealth and reputation as a landowner and pioneer pastoralist of Guthrie Smith, another of McCaskill's heroes, nor did he have Guthrie Smith's resplendent facility with words and prose enshrined in his classic history of the North Island countryside, "Tutira". Yet the contribution of McCaskill to the cause of conservation in New Zealand, and the success of his life-long endeavours to protect and preserve the environment and natural heritage of all New Zealanders is not one wit inferior to that of either Cockayne or Guthrie Smith. To me he ranks with both as naturalist and conservationist.

One thing is certain. So full was Lance McCaskill's life of worthwhile effort and public service, so many the causes he successfully espoused, and so crowded the succession of careers he pursued that those who in future present the McCaskill Memorial Lecture will long be able to speak about him, if they are so inclined, without treading on each other's toes, and without exhausting the story of their subject's life and work and successes.

I end where I began. I am proud to have had Lance McCaskill call me his 'old friend', and to have had this opportunity of paying him a quite incomplete and inadequate tribute.